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FINAL

JACK PILE - PAGUATE



Uranium Mine Reclamation Project ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 1986

VOLUME 2

US DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT
ALBUQUERQUE DISTRICT OFFICE

BUREAU OF INDIAN AFFAIRS
ALBUQUERQUE AREA OFFICE



BLM-NM-ES-86-018-4134

Chapter 4

consultation and coordination

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DEPOSITORY

INTRODUCTION

This Chapter describes the public involvement activities leading up to the preparation of this document. Also included is a listing of those agencies and affected parties requested to review and comment on the Draft Environmental Impact Statement (DEIS), a listing of those individuals involved in the preparation of this document, a listing of consultants and contributors, the public comments (both written and oral) received on the DEIS and corresponding Departmental responses.

SCOPING AND CHRONOLOGY OF THE EIS

The Council of Environmental Quality (CEQ) Regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA) require an early and open process for determining significant issues to be analyzed in depth in an EIS. This process is called "scoping". To ensure implementation of these regulations, the Department of the Interior (DOI) consulted and coordinated with various Federal, State and local agencies, the Pueblo of Laguna (POL), Anaconda Minerals Company (AMC) and interested persons.

The following listing describes the major events and consultation and coordination activities that took place prior to and during the development of this EIS. Public announcements, meeting attendance lists, summaries of meetings and all public comments are on file at the BLM Albuquerque District Office, Rio Puerco Resource Area.

February 25, 1977 - Anaconda submitted a mining and reclamation plan for all remaining mining operations. U.S. Geological Survey (USGS), Conservation Division (CD), prepared a draft environmental assessment; however, because of changes in the mining plan and additional environmental concerns cited by the USGS, no action was taken on the plan.

March 29, 1979 - Anaconda submitted a revised mining and reclamation plan which projected mining until 1985.

September 11, 1980 - Anaconda filed with USGS a three volume reclamation plan for the Jackpile-Paguate uranium mine. In the plan, Anaconda stated that it would discontinue production from two existing underground mines.

December 2, 1980 - The Chief of the USGS-CD, with concurrence by the Assistant Director for Resource Programs, determined that approval of the proposed reclamation plan would constitute a major Federal action, and therefore, that an EIS would be required.

February 19, 1981 - A "Notice of Intent" to prepare an EIS and to hold public scoping meetings on the reclamation of the Jackpile-Paguate uranium mine was published in the Federal Register (Vol. 44, No. 33, p. 13045). This Notice announced the availability of a proposed scoping document for the EIS. This scoping document summarized Anaconda's

reclamation plan, anticipated issues and concerns, proposed alternatives and identified responsible personnel. The dates and locations of public meetings were also cited.

March 16, 1981 - A public meeting was held in the Laguna Tribal Council Building, Laguna, New Mexico. Seventy people attended including Laguna Councilmen, Anaconda representatives and local residents. Nineteen people made oral presentations. A scoping document containing preliminary issues, as identified by the DOI, was distributed to those in attendance. DOI representatives briefly discussed the following possible issues:

1. Release of radon gas into the atmosphere.
2. Radiological decontamination of existing buildings.
3. Radiological contamination of Paguete Reservoir and the Rios Paguete and Moquino.
4. Radiological contamination of ground water.
5. Radiological contamination of the human food chain.
6. Loss of uranium resources.
7. Abandonment of underground openings.
8. Highwall stabilization.
9. Waste dump stabilization.
10. Recontouring the minesite to prevent erosion.
11. Siltation of Paguete Reservoir.
12. Construction of a productive soil profile.
13. Selection of productive revegetation species.
14. Contamination of surface waters.
15. Future land use.
16. Aesthetic impacts of land form modification.
17. Reclamation costs.
18. Pueblo of Laguna employment during reclamation.
19. Reclamation standards.
20. Long-term monitoring.

The Governor of the Pueblo of Laguna outlined 5 main concerns of the Pueblo: 1) air and water quality and socioeconomic impacts; 2) preservation of, and access to religious and cultural sites; 3) safety; 4) monitoring, and 5) unrecovered uranium reserves. Other comments were made with regard to the following: the EIS process and procedures, health effects (mining and post-reclamation), timetable to complete reclamation, level of backfill in each of the pits, radionuclide uptake into plant species, ore spillage at Quirk loading dock and along the rail spur, renovation of homes in the Village of Paguate and realignment of State Highway 279.

March 18, 1981 - A public meeting was held at the Classic Hotel, Albuquerque, New Mexico. Sixty-seven people attended including representatives from the Pueblo of Laguna and Anaconda Minerals Company. Seven people made oral presentations and six written comments were submitted. DOI representatives briefly summarized the same 20 issues presented at the meeting held March 16, 1981. Most of the comments received pertained to these issues. Other comments included a recommendation that the EIS adopt the Nuclear Regulatory Commission/Environmental Protection Agency regulations and standards for radiological clean-up at uranium mill sites. Two commentators questioned the DOI's authority and need to prepare an EIS.

March 23, 1981 - DOI representatives met with the Laguna Tribal Council to explain the EIS process and solicit comments on major issues and concerns. Council members suggested that the EIS address the following: wildlife, farming, tourism, employment, waterflow and supply at the housing area, revegetation of native species suitable for livestock grazing, birth defects, cancer rates, drug abuse, alcoholism, sedimentation of Paguate Reservoir, placement of rock piles on reclaimed dumps, contamination of adjacent lands, renovation of homes in the Village of Paguate, timetable for reclamation, preservation of religious sites, realignment of the Rio Paguate, water quality, use of contaminated materials for home construction, compensation for the people psychologically damaged by the mining operations, plugging abandoned drill holes, reclamation of exploration roads on Black Mesa, and radiological contamination of crops grown and livestock raised on reclaimed areas.

August 20, 1981 - Anaconda withdrew the proposed reclamation plan submitted to USGS on September 11, 1980 because of plans to reroute State Highway 279 through the mine.

September 17, 1981 - DOI, POL and Anaconda met to discuss the rerouting of State Highway 279 through the minesite, and the recent withdrawal of Anaconda's proposed reclamation plan.

March 16, 1982 - Anaconda filed with the USGS a revised three-volume reclamation plan for the Jackpile-Paguate uranium mine. This plan is one of several alternatives currently being evaluated in this EIS.

June 22, 1982 - DOI, POL and Anaconda agreed to form a technical committee to help define and resolve the differences between the Pueblo and Anaconda over reclamation of the Jackpile-Paguate minesite. The committee was comprised of representatives from DOI, POL and Anaconda. The committee met on several occasions and was able to resolve several issues. Those issues resolved included: removal of all rockpiles from the waste dumps, planting up to 1000 tree seedlings and agreement on the types of revegetation species to be used in the reclamation program. Issues not resolved included: the length of post-reclamation monitoring, configuration of waste dump slopes, stabilization of the North and South Paguate highwalls, disposition of the railroad spur, disposition of the buildings and equipment, damage to Paguate housing, sedimentation of Paguate Reservoir, the depth of topsoil cover, stabilization of arroyo headcuts, post-reclamation grazing management, disposition of protore stockpiles and the level of pit backfill. The last technical committee meeting was held November 10, 1982.

April 16, 1984 - BLM began to resurvey the minesite to accurately determine existing topography. Aerial photography and computerized techniques (digitizing) would then be used to calculate material volume requirements for reclamation.

May 18, 1984 - DOI officials met with the New Mexico State Environmental Improvement Division (EID) to present them with the status of the Jackpile-Paguate mine reclamation project and to solicit comments. EID asked questions regarding reclamation impacts on air and water quality.

August 21, 1984 - DOI representatives met with the Pueblo of Laguna Tribal Council to provide an update on the EIS and various studies including the USGS, Water Resource Division (WRD) hydrologic evaluation, radiological assessments and the photogrammetric/digitizing effort.

August 27, 1984 - USGS, WRD completed a short-term evaluation of the Dames and Moore ground water model. WRD established that this model contained no inconsistencies of a mathematical or programming nature which significantly affected its results. However, WRD's analysis revealed that the water levels computed by the Dames and Moore model were sensitive to the assumed input parameters.

October 1, 1984 - DOI, POL and Anaconda representatives met with the Assistant Secretary for Land and Minerals Management to discuss 1) Anaconda's cash settlement offer to the POL, and 2) the recent USGS, WRD evaluation of the Dames and Moore ground water model. In regard to the cash settlement offer, the Assistant Secretary informed all parties that the DOI would not be in a position to advise the POL on the suitability of the offer until the EIS is completed. In regard to the ground water recovery issue, the Assistant Secretary stated that the evaluation conducted by USGS, WRD placed the BLM in a position to adopt the Dames and Moore findings subject to a long-term monitoring program.

October 15, 1984 - BLM, through its photogrammetric and digitizing efforts, completed volumetric calculations for pit backfill levels, waste dumps and slope configurations. This information would be used for engineering design and reclamation cost estimates for the reclamation proposals being evaluated in the EIS.

March 5, 1985 - The DEIS was filed with the Environmental Protection Agency.

March 6, 1985 - A news release was issued announcing availability of the DEIS and information regarding public hearings. Approximately 650 copies of the DEIS were mailed to Federal, State and local agencies, and various groups and individuals for their comments. The public comment period was from March 6, 1985 to June 6, 1985.

April 19, 1985 - An extension of the public comment period to October 4, 1985 was announced in the Federal Register, Volume 50, No. 76. The comment period was extended at the request of Anaconda Minerals Company and the Pueblo of Laguna. The public was notified of this change by a news release and by written notice sent to each recipient of the DEIS.

July 31, 1985 - A notice was published in the Federal Register, Volume 50, No. 147 announcing that the public hearings were rescheduled for September 10 and 11, 1985. This rescheduling was necessary because of the extended public comment period. The public was notified of these new hearing dates by a news release and by written notice sent to each recipient of the DEIS.

August 19, 1985 - Anaconda Minerals Company submitted a preliminary version of a new reclamation plan entitled the "1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Uranium Mine, Cibola County, New Mexico." Anaconda stated that this new plan rendered the 1982 "Green Book" plan obsolete and withdrew the "Green Book" from further consideration in the EIS process.

September 10, 1985 - A public hearing was held at the Albuquerque Convention Center, Albuquerque, New Mexico. Approximately 150 people attended including representatives from the Pueblo of Laguna, Anaconda Minerals Company and interested members of the public. The majority of comments were directed at radiological issues, volumetric estimates and associated costs, blast damage to the homes in Paguate Village, legal issues, reclamation parameters, mitigation measures, and Anaconda's 1985 Multiple Land Use Reclamation Plan.

September 11, 1985 - A public hearing was held in the Laguna Tribal Council Building, Laguna, New Mexico. Approximately 180 people attended including representatives from the Pueblo of Laguna, Anaconda Minerals Company and interested members of the public. The majority of comments were directed at radiological issues, blast damage to the homes in Paguate Village, and Anaconda's 1985 Multiple Land Use Reclamation Plan.

October 4, 1985 - The public comment period officially closed. Anaconda submitted the final version of the new 1985 Multiple Land Use Reclamation Plan.

April 4, 1986 - DOI ordered Anaconda to fence the minesite, provide for 24 hour security and to post warning signs around the periphery of the mine area. DOI took this action under the authority of the lease terms and operating regulations.

DISTRIBUTION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Comments on the Draft Environmental Impact Statement were requested from the following:

Tribal Government
Pueblo of Laguna

Lessee
Anaconda Minerals Company

Federal Government

Advisory Council on Historic Preservation
Environmental Protection Agency
Nuclear Regulatory Commission
U.S. Department of Agriculture
 Agriculture Stabilization and Conservation Service
 Forest Service
 Soil Conservation Service
U.S. Department of the Army
 Corps of Engineers
U.S. Department of Energy
U.S. Department of Health and Human Services
 Indian Health Service
U.S. Department of Housing and Urban Development
 Office of Indian Programs
U.S. Department of the Interior
 Bureau of Mines
 Bureau of Reclamation
 Fish and Wildlife Service
 Geological Survey
 Minerals Management Service
 Office of Surface Mining, Reclamation and Enforcement
 National Park Service
U.S. Department of Labor
 Mine Safety and Health Administration
 Occupational Safety and Health Administration
U.S. Department of Transportation

National Laboratories

Argonne National Laboratory
Los Alamos Scientific Laboratory

New Mexico State Government

Governor of New Mexico
Bureau of Mines and Mineral Resources
Department of Agriculture
Department of Energy and Minerals
Department of Finance and Administration
Department of Game and Fish
Department of Health and Environment
Division of State Forestry
Natural Resources Department
Office of Indian Affairs
State Engineer's Office
State Heritage Program
State Highway Department
State Historic Preservation Officer
State Land Office
State Park and Recreation Commission

Local Governments

Cibola County Commissioners
Mayor of Grants
Village of Milan

Approximately 350 copies of the DEIS were also sent to various professional societies and organizations, interest groups and individuals.

TEAM ORGANIZATION AND CONTRIBUTORS

This EIS was prepared by a team of professionals within the Department of the Interior. These specialists were responsible for the preparation and/or review of various sections within the document. Departmental personnel involved in the preparation of this EIS are listed in Table 4-1. Consultants and other contributors are indicated in Table 4-2.

COMMENTS AND RESPONSES

During the formal review and comment period (March 6 to October 4, 1985), 19 memoranda and letters were received from agencies and the public. After the close of the review and comment period, an additional eight written comments were received. All correspondence is listed in Table 4-3.

The purpose of the public hearings held in Albuquerque and Laguna, New Mexico was to receive testimony on the merits of the mine reclamation alternatives and/or the technical adequacy of the DEIS. Table 4-4 lists those persons which presented testimony at the hearings. The originals of the letters, memoranda, transcripts and exhibits are available for public inspection at the BLM Albuquerque District, Rio Puerco Resource Area Office, Albuquerque, New Mexico.

All memoranda, letters and public hearing testimonies were reviewed to determine if the comments were substantive (i.e. addressed the merits of the mine reclamation alternatives and/or the technical adequacy of the DEIS). Responses are correspondingly presented to all substantive comments.

Most comments were directed at radiological issues, volume of materials to be moved, cost of reclamation, blast damage to homes in Paguate Village and Anaconda's 1985 Multiple-Use Plan. DOI reviewed the report prepared by Argonne National Laboratory (ANL/ES-131) which forms the basis for the radiological impact analysis in the EIS. The principal author of that report, Dr. M. Momeni commented on various portions of ANL/ES-131. His major comment was that there had been a data entry error which erroneously raised the projected incidence of kidney and urinary system cancers. For this EIS, cancer incidences have been recalculated using revised risk coefficients as recommended by BEIR, 1980. The revised estimates are presented in Chapter 3 of the EIS.

Identifiers have been used to denote substantive comments requiring a reply. For written comments, the control number shown in Table 4-3 is used as the identifier. Public hearing testimonies have been reproduced in their entirety. The Departmental responses to written comments also respond to the points raised during the hearings since both sets of comments were similar in content.

TABLE 4-1

LIST OF PREPARERS

Name	EIS Assignment	Education	Experience
<u>PROJECT MANAGEMENT</u>			
Michael J. Pool	Overall Project Manager and BLM Task Force Leader	B.S. Agriculture	BLM - 6 yrs. Supv. Environmental Protection/Natural Resource Specialist - 2 yrs. Realty Specialist - 1½ yrs. Range Conservationist
William C. Allan	BIA Task Force Leader, Cultural Resources	B.A. Anthropology M.A. Social Sciences	BIA - 6 yrs. Environmental Quality Specialist - 4 yrs. Archaeologist UNM - 2½ yrs. Archaeologist Museum of NM - 2 yrs. Archaeologist
John M. Andrews	Technical Coordinator, Radiation and Air Quality	B.S. Geology	BLM - 2½ yrs. Environmental Protection Specialist MMS - 1 yr. Environmental Scientist USGS - 3 yrs. Environmental Scientist - 7 yrs. Physical Scientist NYGS - 1 yr. Geologist
Sarah W. Spurrier	Editor	B.A. Psychology	BLM - 7 yrs. Technical Publications Editor
<u>TEAM SPECIALISTS</u>			
John Arwood	Flora	B.S. Range Management, Animal Husbandry, Agricultural Economics	BLM - 17 yrs. Range Conservationist
Pete Balleau	Hydrology	B.A. Geology	BIA - 7 yrs. Hydrologist Consulting Firm - 4 yrs. Senior Hydrogeologist Geological Survey (Australia) - 3 yrs. Hydrogeologist Gov. of Kenya - 2 yrs. Provincial Water Officer
John Bristol	Visual Resources	B.A. Landscape Architecture	BLM - 3 yrs. Outdoor Recreation Planner - 5 yrs. Landscape Architect USFS - 8 yrs. Landscape Architect
Kent Hamilton	Economics and Reclamation Cost Estimates	B.S. Agricultural Economics	BLM - 8½ yrs. Economist BIA - 15½ yrs. Economist
Steve Hamp	Hydrology	B.S. Geology M.S. Hydrology	BLM - 7½ yrs. Hydrologist

TABLE 4-1 (Continued)

Name	EIS Assignment	Education	Experience
Dave Koehler	Standards of Vegetative Response	B.S. Range and Forestry M.S. Ecosystem Ecology PhD Range Ecology	BLM - 7 yrs. Chief, Br. Range Mgmt. Colorado State Univer. - 3 yrs. Research Assoc. (mine reclamation) Consulting Firm - 2 yrs. Envir. Consultant Oregon State Game Commission - 1 yr. Research Biologist USFS - 6 yrs. Range Conservationist
Mackie E. Murphy	Engineering Design and Blast Damage	B.S. Civil Engineering	BIA - 6 yrs. Civil Engineer - 7 yrs. Structural Engineer Army Corps of Engrs. - 3 yrs. Structural Engineer Engineering Firms - 9 yrs. Senior Vice President 2 yrs. Structural Engineer
Beverly Ray-Edwards	Socioeconomics	B.A., M.A. Psychology and Sociology PhD Sociology	BLM - 6½ yrs. Sociologist University Professor - 10 yrs. teaching in psychology sociology and anthropology
Joe Rasmussen	Engineering Design and Reclamation Cost Estimates	B.S. Mining Engineering B.S. - Mathematics	BLM - 3 yrs. Mining Engineer MMS - 1 yr. Mining Engineer USGS - 6 yrs. Mining Engineer USBM - 1 yr. Mining Engineering Private Industry - 2 yrs. Mining Engineer
Vern Rulli	Geology and Mineral Resources	B.A., M.S. Geology B.S. Geology Engineering	BLM - 1½ yrs. Mining Engineer MMS - 1 yr. Mining Engineer USGS - 3 yrs. Mining Engineer
Dave Sitzler	Mining Operations, Non-Radiological Minesite Hazards, Engineering Design and Reclamation Cost Estimates	B.S. Geological Engineering	BLM - 2½ yrs. Mining Engineer MMS - 1 yr. Mining Engineer USGS - 4½ yrs. Mining Engineer
Bill Smith	Highwall and Waste Dump Stability	Geol. E., M.S., PhD Geological Engineering	USGS - 11 yrs. Geologist USBM - 2 yrs. Civil Engineer Colorado State - Professional Engineer
Greg Smith	Stream Channel Stability, Waste Dump Erosion and Arroyo - Headcut Erosion	B.S., M.S. Geology	MMS - 3 yrs. Geologist USGS - 2 yrs. Geologist Private Industry - 2 yrs. Geologist

TABLE 4-1 (Concluded)

Name	EIS Assignment	Education	Experience
Joe Sovcik	CEQ Compliance, Interagency Coordination, Impact Analysis and Mitigation	B.S. Biology	BLM - 7 yrs. Environmental Coordinator EPA - 9 yrs. Biologist and Water Resource Planner
Gary Stephens	Hydrology and Fauna	B.S. Geology	BLM - 2½ yrs. Inspection and Enforcement Specialist MMS - 1 yr. Environmental Scientist USGS - 5 yrs. Environmental Scientist Consulting Firm - 4 yrs. Geologist
Jerry Wall	Soils	B.S., M.S. Forest Soils	BLM - 8 yrs. Soil Scientist USFS - 9 yrs. Soil Scientist
Bill White	Hydrology	M.S. Geology	BIA - 5½ yrs. Hydrologist
Ralph Wilcox	Geology and Mineral Resources	B.S., M.S. Geology	BLM - 2½ yrs. Geologist MMS - 1 yr. Geologist USGS - 2½ yrs. Geologist - 1 yr. Hydrologist
Don Zoss	Blast Damage, Engineering Design and Reclamation Cost Estimates	B.S. Geological Engineering	BLM - 5½ yrs. Mining Engineer USGS - 5 yrs. Mining Engineer State Hwy. Dept. - 3 yrs. Geologist
<u>Administrative/Technical Support</u>			
Myrna Finke - Visual Information Specialist			
Janice Hinds - Clerk-Typist			
Powell King - Mining Engineer			
Emilio Montoya - Cartographic Technician			
Irene Mora - Editorial Assistant			
Jim Olsen - Geologist			

TABLE 4-2
CONSULTANTS AND CONTRIBUTORS

Organization	Area of Assistance
<u>Tribal Government</u>	
Pueblo of Laguna	Information on the past and present land use of the minesite and surrounding areas.
Council of Energy Resource Tribes	Socioeconomic reports and consultant to the Pueblo of Laguna on various issues.
<u>Lessee</u>	
Anaconda Minerals Company	Mine plans and technical information on photogrammetry, hydrology, radiology, blast damage, plant stability evaluations, subsidence, highwall and waste dump stability.
<u>Federal Government</u>	
Environmental Protection Agency	Consultant to DOI on radiological assessments and analysis.
U.S. Department of Agriculture	
Forest Service - Rocky Mountain Forest and Range Experiment Station	Consultant to DOI on plant stability and revegetation
Soil Conservation Service	Guidance on seeding rates, seed mixtures and analysis of erosional impacts
U.S. Department of the Interior	
Bureau of Indian Affairs	Water quality analysis and hydrologic modeling evaluations
Bureau of Land Management - New Mexico State Office and Denver Service Center (Cadastral Survey, Divisions of Mapping Systems and Data Technology)	Cadastral survey, aerial photography, photogrammetric analysis and volumetric computations
Bureau of Mines	Assessment of potential blasting impacts from mine reclamation activities
Geological Survey	Analysis of minesite ground and surface water systems, water quality analysis, hydrologic modeling evaluations and analysis of erosional impacts
<u>National Laboratories</u>	
Argonne National Laboratory	Consultant to DOI on radiological impacts of mine reclamation

TABLE 4-3

MEMORANDA AND LETTERS RECEIVED ON THE DEIS

Control Number	Date Received In BLM Albuquerque District Office	Commentor
1	03/13/85	Albuquerque Archeological Society
2	05/02/85	USDI - Office of Surface Mining
3	05/10/85	USDA - Soil Conservation Service
4	05/23/85	Radiation Survivors Congress 1984
5	06/03/85	Dotte Troxell
6	06/14/85	USDHHS - Public Health Service (Center for Disease Control)
7	06/18/85	USDOA - Corps of Engineers
8	07/08/85	Anaconda Minerals Company
9	08/05/85	NM Bureau of Mines & Mineral Resources
10	08/19/85	Anaconda Minerals Company
11	09/11/85	USDHHS - Public Health Service (Acoma-Canoncito-Laguna Indian Hospital)
12	09/23/85	USDL - Mine Safety and Health Administration
13	10/03/85	USDI - Geological Survey
14	10/03/85	Council of Energy Resource Tribes
15	10/04/85	Pueblo of Laguna
16	10/04/85	Renee A. Paisano
17	10/04/85	American Indian Environmental Council
18	10/04/85	Sierra Club
19	10/04/85	Holland & Hart
20	10/04/85	Anaconda Minerals Company
21	10/07/85	Thomas R. Shelley
22	10/07/85	USDI - Fish and Wildlife Service
23	10/07/85	USDI - National Park Service
24	10/07/85	USEPA - Region VI
25	10/07/85	Gerald Pedro
26	10/08/85	USDHHS - Public Health Service (Health Resources and Services Administration)
27	10/09/85	Southwest Research and Information Center
28	10/10/85	State of New Mexico (Office of the Governor)

TABLE 4-4

PUBLIC HEARING SPEAKERS

Name	Agency, Organization, Individual
<u>September 10, 1985 - Albuquerque, New Mexico</u>	
Mr. Meade Stirland	Anaconda Minerals Company (AMC)
Ms. Susan Smith	Holland and Hart (Counsel to AMC)
Dr. Leonard Hamilton	Brookhaven National Laboratory (Consultant to AMC)
Dr. Lyda Hersloff	Radiant Energy Management (Consultant to AMC)
Dr. Leo Lowe	SENES Consultants, Limited (Consultant to AMC)
Mr. Ben Boyd	Morrison-Knudsen Corporation (Consultant to AMC)
Mr. Fred Kelsey	AMC
Dr. Ben Seegmiller	Seegmiller International (Consultant to AMC)
Dr. Kenneth Ludeke	Ludeke Corporation (Consultant to AMC)
Dr. Warren Keammerer	Stoecker-Keammerer & Associates (Consultant to AMC)
Mr. Larry Murdock	Dames & Moore (Consultant to AMC)
Mr. Gordon Toll	AMC
Mr. Robert Beverly	American Mining Congress
Governor Chester T. Fernando	Pueblo of Laguna (POL)
Mr. Les Taylor	Nordhaus, Haltom, Taylor & Taradash (Counsel to POL)
Mr. Marc Nelson	Jacobs Engineering Group (Consultant to POL)
Mr. Harold Lockwood	POL
Ms. Laura Graham	POL
Ms. Dorothy Purley	POL
Ms. Josephine Abeyta	POL
Ms. Elizabeth Wacondo	POL
Mr. John Gaco	POL
Mr. Tim Anaya	POL
Mr. Santiago Sarracino	POL
Ms. Louise Cheromiah	POL
Mr. Clarence Acoya	POL
Mr. John Delores	POL
Mr. David Lester	Council of Energy Resource Tribes (Consultant to POL)
Mr. Lloyd Dailey	POL
Mr. Paul DePino	POL
Mr. Herman Garcia	POL

EXHIBITS

The five exhibits submitted at the public hearings have not been reproduced in the FEIS due to their volume and nature. The originals of all exhibits may be inspected at the BLM Albuquerque District, Rio Puerco Resource Area Office Albuquerque, New Mexico.

Exhibit 1 - Assessment of the Scientific Basis For Existing Federal Limitations on Radiation Exposure to Underground Uranium Miners. Prepared for the American Mining Congress by SENES Consultants, Limited, October 1984. Submitted by Robert Beverly.

Exhibit 2 - Sources of Radon Emissions in the U.S. (Pie Chart). U.S. Nuclear Regulatory Commission 1981. Submitted by Robert Beverly.

TABLE 4-4 (Continued)

PUBLIC HEARING SPEAKERS

Name	Agency, Organization, Individual
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Exhibit 3 - Sources of Radon Dose to the U.S. Population. U.S. Nuclear Regulatory Commission 1979. Submitted by Robert Beverly.

Exhibit 4 - Twenty-two photographs of alleged blast damage to houses in the Village of Paguate. Submitted by Governor Chester T. Fernando.

September 11, 1985 - Laguna, New Mexico

Mr. Meade Stirland	AMC
Ms. Susan Smith	Holland and Hart (Counsel to AMC)
Mr. Marc Nelson	Jacobs Engineering Group (Consultant to POL)
Dr. Ahmed Kooros	Council of Energy Resource Tribes (Consultant to POL)
Mr. B. Reid Haltom	Nordhaus, Haltom, Taylor & Taradash (Counsel to POL)
Mr. Bobby Vallejos	Board of Trustees (Seboyeta Land Grant)
Ms. Rachel Garviso	POL
Mr. Herman Garcia	POL
Mr. Orlando C. Romero	POL
Mr. Lloyd Dailey	POL
Ms. Dorothy Purley	POL
Mr. Lawrence Pacheco	POL
Ms. Rita Romero	POL
Mr. Clarence Acoya	POL
Mr. Elmer Hunt	POL
Mr. Larry Garcia	POL
Mr. Wil Lente	POL
Mr. Walter Arkie	POL
Mr. John Pino	POL
Mr. Delfino Begay	POL
Mr. Martin Kowemy	POL
Mr. Conrad Lucero	POL
Mr. Henry Anaya	POL
Governor Chester T. Fernando	POL
Mr. Martin Tsiosdia	POL
Mr. Larry Lente	POL
Mr. Bobby Vallejos	Board of Trustees (Seboyeta Land Grant)
Mr. Louis Jaramillo	POL
Mr. Robert Thomas	POL
Mr. Calvin Pino	POL
Mr. Daniel Carr	POL
Mr. Victor Sarracino	POL
Mr. Chris Shuey	Southwest Research & Information Center
Mr. Paul Lusk	Individual
Mr. David Riley	Individual
Governor Chester T. Fernando	POL

Exhibit 5 - Eight photographs of alleged blast damage to houses in the Village of Paguate. Submitted by Wil Lente.

WRITTEN COMMENTS

1

ALBUQUERQUE  ARCHAEOLOGICAL
SOCIETY

MARCH 11, 1985

To: Mike Pool (EIS Team Leader)
USDI-Bureau of Land Management
3550 Pan American Freeway NE
P.O. Box 6770
Albuquerque, NM 87197-6770

Subject: Draft Environmental Impact Statement (EIS) for the
Jackpile-Paguate Uranium Mine Reclamation Project, dtd 2/85.

Reference: United States Department of the Interior letter dated
3/6/85, Ref: Jackpile-Paguate EIS, 3042.

Dear Sir,

We have received the subject EIS. Thank you for sending us a copy. We have reviewed it for impacts on cultural resources, and our only concern is that cultural resources not be adversely impacted. Apparently all courses of action have little or no direct impact, but once reclamation is completed, if it is, then according to the EIS easier access to cultural sites may cause increased vandalism. Unfortunately this is probably true. But it should be possible to include in the overall reclamation project funding enough money to pay for increasing law enforcement personnel to a level sufficient to enable a once-a-day patrol of the area on weekends, and an every other day patrol during the week. We recommend such patrolling be funded and that it continue until such time as regular law enforcement staff are able to take over.

Respectfully yours,

William M. Sundt

William M. Sundt, for the
Albuquerque Archaeological Society

cc: President's file



po box 4029 albuquerque new mexico 87106-
57196



United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

APR 29 1985

MEMORANDUM

TO: Mike Pool, EIS Team Leader, Rio Puerco Resource Area, New Mexico, Bureau of Land Management

FROM: Mel Shilling, Chief, Mining Analysis Division, Western Technical Center, Office of Surface Mining Reclamation and Enforcement

SUBJECT: Jackpile-Paguate Uranium Mine Reclamation Project, New Mexico, Environmental Impact Statement (EIS)

We have reviewed the draft EIS for the Jackpile-Paguate Reclamation Project and have no suggestions for its improvement.

We appreciate this opportunity to participate in the review of the document and look forward to seeing the final EIS.



United States
Department of
Agriculture

Soil
Conservation
Service

517 Gold Avenue SW, Room 3301
Albuquerque, NM
87102

May 7, 1985

Mr. Mike Pool
EIS Team Leader
USDI-Bureau of Land Management
P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool:

We have reviewed the EIS for the Jackpile-Paguate Uranium Mine Reclamation Project.

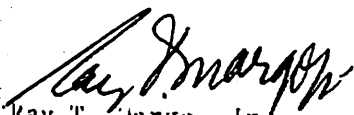
The proposals for controlling arroyo headcutting which appear on pages 3-32 through 3-34 were given particular consideration. We feel that the DOL and Laguna proposal has merit.

31 The headcut inverted filter should help to reduce any piping or cutting around the armoring. You may want to consider using a filter cloth as a replacement for some of the finer grained elements of the filter.

The enclosed typical section of a rock check dam which utilizes filter cloth as a part of the dam would also help in stabilizing the channel above the check dam. The proposed rock check dam may be porous enough so that it would not stabilize the channel.

If you want to discuss these suggestions, please contact Stan Cook, Assistant State Conservation Engineer, at 766-1643.

Sincerely,


Ray T. Hargo, Jr.
State Conservationist

Enclosure

cc:

Stan Cook, Assistant State Conservation Engineer, SCS, Albuquerque, NM



The Soil Conservation Service
is an agency of the
Department of Agriculture

RADIATION SURVIVORS CONGRESS 1984

c/o Pine United Methodist Church
426 - 33rd Ave.
San Francisco, CA 94121
Phone (415) 387-1800

May 17, 1985

U.S. Department of the Interior
Bureau of Land Management
Rio Puerco Resource Area
3550 Pan American Freeway, NE
PO Box 6770
Albuquerque, NM 87197-6770

Dear Sirs:

Our Congress wishes to go on record as opposing the very inadequate Environmental Impact Statement (EIS) for the Jackpile-Paquate Uranium Mine Reclamation Project. We find it seriously deficient. We urge you to implement instead, the Indian Tribal Council's "Laguna Report." If this is adopted and carried out, an adequate reclamation project will result.

Very truly yours,

Nobu Nanaoka
Rev. Nobu Nanaoka

Dorothy Lagaretta
Dorothy Lagaretta
Ph.D.

DL/jms

May 28, 1985

Mike Pool (EIS Team Leader)
USDI-Bureau of Land Management
3550 Pan American Freeway NE
P.O. Box 6770
Albuquerque, NM 87197-6770

Ref: EIS -Jackpile-Paguate Uranium
Mine Reclamation Project

Dear Mr. Pool,

Having carefully studied the above referred to EIS, I urge you to accept the Laguna Proposal over the No Action Alternative, the Anaconda, and the DOI proposals. There are areas, even in the Laguna Proposal that are inadequate and questionable.

My main objections to all of the proposals and the Laguna Proposal are:

(1) the length of monitoring (Table 1-3, p. 1-19). In my opinion monitoring of this area should continue indefinitely due to erosion factors and other conceivable land abuses, and should not be restricted by any time factor.

(2) post-reclamation land uses (Table 1-3, p. 1-20) Education is lacking in this area, due to the years of suppression by the military-industrial complex, that has benefited by with-holding the biological damage and inherit genetic damage of radiation to all life forms and species. Insects, rodents and other burrowing wild life are not taken into consideration in this report. It is my opinion that cattle should not be allowed in this area and that all hunting, trapping, and fishing should be prohibited as well as manufacturing, storage, etc. I feel it is the responsibility of the Secretary of the Interior in a "guardian-ward" relationship to protect the native Americans involved in regard to the biological damage of radioactivity. The sources of information, in regard to standards of radiation protection, are the same sources that have produced over one million radiation cases resulting in debilitating illnesses and genetically afflicted offspring and therefore should be cautiously evaluated. Can the tribes continue to inhabit this area? An increase in diabetes, which is the result of immunological failure, has already been noted in these people, which makes the generally accepted guidelines for exposures appear deliberately misleading and inaccurate.

(3) p. 3-25 "--Argonne National Laboratory will study the radiological impact to workers involved in reclamation." and "Anaconda Minerals Company would be required to provide mitigation." In light of present legislation and the cover-up tactics by the nuclear industry, I find the first quote in the category of "human experimentation"; and the second deliberately misleading, due to contractor immunity recently initiated blocking any attempt for justice within the court system.

(4) Ionizing radiation destroys cells, produces organ damage and should not be "generally referred to" as on p. C-7. The long term latent effects, cause acceleration of aging and an earlier onset of disease, due to the breakdown of the immune system. Sufficient time has not passed to determine the health and genetic damage due to the mining operation. I strongly disagree with the statements made on this page and others, due to the cover-up of health hazards by the nuclear

industry in protecting the AEC Safety Record, their jobs, etc. It is, in my opinion, the crime of the century, a crime perpetrated by institutions receiving substantial government grants. This crime is still being perpetrated against our citizens within the uranium mine areas, the nuclear installations, research labs, the military, industry and the medical world for profit.

(5) The lack of concern, which is over all expressed in the reclamation EIS, for the future mental and physical health of the tribes and other citizens in the Albuquerque area, by not addressing all issues involved in a massive radiation exposure area--I find very upsetting! The fact, there is not legislation over mining operations of this nature is scandalous. I feel p. 1-7, and 1-8 "Issues Dropped", as being "not within the scope of this EIS", should be included for you can not deal with the future without understanding the past.

(6) I favor the Laguna plan as it appears to be superior in regard to physical protection. I am concerned, however, for EPA recognizes that more than 80% of hazardous waste disposed of on land will eventually migrate from its original site. I question strongly the impact of all proposals on air, streams, and water sources. I am deeply concerned about the food and water supply of the tribes involved directly, and the future of downstream and area citizens. I feel that the plan should encompass more safety features and that presently it contradicts the "Clean Water Act."

In summary, I can only say that it takes courage to create a peaceful solution to a disaster. This is the category I would place the Jackpile-Paguate within, along with other uranium mine areas. It is imperative that you recognize the importance of this project, for like it or not,--it will set a precedent for other radioactive areas. You have my deepest sympathies in regard to your undertaking. Bureaucratic regimentation has created an unbelievable challenge to modern technology in attempting to restore and make safe the ravaged land of the Laguna tribes, the pueblos and others. The trust responsibility, in this region in the past, has been outrageously violated-- threatening these native Americans survival as a race. I can speak brutally frank on this issue for I am a victim of the "acceptable dosage" standard. My exposures to ionizing radiation was supposedly well within "the safe range", according to AEC biologist, Dr. Frederick G. Hirsch of Albuquerque and other high ranking doctors and scientists. I suffered years of sterility, failure of my immune system, radiation cataracts at 39 years of age, intense muscle and bone pain. I have a genetically afflicted child due to my so-called "safe" chronic ionizing exposure which occurred over 30 years ago.

Thank you for your time and attention. May God guide you in your decisions for you are dealing directly with irreversible forces that determine the quality of all life.

Sincerely,

Dottie Troxell

Dottie Troxell,

Rt. 1, KegKrest

Lexington, Missouri 64067

Laboratory Workers Representative
National Association of Radiation Survivors
Radiation Survivors Congress- 1984-85

c/c ORAU/ORNL Committee on Human Studies
Uranium Miners and Millers
CARS



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

REPLY TO
ATTENTION OF

June 13, 1985

Engineering and Planning Division
Planning Branch

Mr. Mike Pool
USDI-Bureau of Land Management
3550 Pan American Freeway Northeast
PO Box 6770
Albuquerque, New Mexico 87197-6770

Dear Mr. Pool:

The Bureau of Land Management's Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project has been reviewed in relation to the Albuquerque District's responsibilities for flood control and administration of Section 404 of the Clean Water Act.

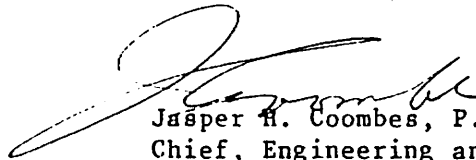
On pages 3-34 and 3-35 under the DOI and Laguna proposals, the design of these structures (rock fill, check dam, and endsill) should preclude any flanking by runoff. Also, the height and spacing of these structures should be so as to promote a stable channel gradient.

7-1 In accordance with regulations (33 CFR 320-330) and pursuant to Section 404 of the Clean Water Act (33 USC 1344) the Corps of Engineers regulates the discharge of dredged or fill material into waters of the United States. We are unable to identify any specific discharges into the waters of the United States from information available in the Environmental Impact Statement. However, considering the close proximity of the Rio Paguate and tributaries, such discharges during the course of the project are likely. Request that discharges of fills into these waters be specifically identified and that the effects of these fills be discussed in the Final Environmental Impact Statement.

The regulations describe a number of exceptions and permits which may be applicable to the project. Summaries of several of these nationwide permits are enclosed for your use. If there are any discharges of material into the Rio Paguate or tributaries which are not permitted by a nation-wide permit or exempted, an individual Department of the Army permit will be required. Copies of the regulation, an informational brochure, and other information are enclosed for your use.

In addition, should an individual permit be required, we request that we become a cooperating agency in accordance with 40 CFR 1506.3 so that we may use the Environmental Impact Statement in our evaluation of the proposal. Should you have any questions or require any additional information, please write or telephone Mr. Mark Sifuentes of my staff, at FTS 474-3517. Additional information regarding the Corps' regulatory program may be obtained from Mr. Andrew Rosenau at FTS 474-2776. The opportunity to comment is appreciated.

Sincerely,



Jasper H. Coombes, P.E.
Chief, Engineering and Planning Division

5 Enclosures

1. N/W Permit Summaries
2. Regulation
3. Brochures
4. Application
5. Map

Copies Furnished:

SWDPL-R



July 2, 1985

Mr. Mike Pool
EIS Team Leader
Bureau of Land Management
3550 Pan American Freeway, N.E.
P. O. Box 6770
Albuquerque, N.M. 87197-6770

Dear Mike:

During the last four months, Anaconda has reviewed the draft environmental impact statement (EIS) for reclamation of the Jackpile-Paguate Mine. This review has been conducted by Anaconda legal and technical personnel, consultants originally retained by Anaconda to develop the 1982 Green Book reclamation plan, and scientific experts who were requested to examine specific aspects of the draft. On the basis of this review, we have concluded that the draft EIS contains analytic and factual errors of such magnitude that it should be withdrawn, completely rewritten, and republished.

Prior to August 1, Anaconda intends formally to request that the draft EIS be withdrawn. We are giving you advance notice now because we presume that you will wish to consider postponing the public hearing scheduled for September 10 and 11 until after the Department has fully evaluated our request.

The most significant mistakes and omissions in the draft EIS are:

1. The no-action alternative was unjustifiably discarded due to presumed impacts of the unreclaimed mine site on human health and safety. The only allegedly significant hazard mentioned in the draft is the radiological health risk, but as item 5 indicates, that hazard is insignificant.
2. The range of alternatives considered was improperly limited to variations of Anaconda's 1982 Green Book plan which is already, to a considerable extent, obsolete. The draft EIS should have considered alternatives involving ultimate land uses other than grazing; instead of merely heaping additional costly and unnecessary requirements upon the Green Book Plan, the report should have independently developed and proposed a broad range of original alternatives.
3. The draft EIS does not accurately estimate the consequences of the 1982 plan, nor does it adequately describe the DOI and Laguna alternatives. The mistinterpretation of the 1982 plan led the DOI to calculate erroneously the volumes of materials to be moved by millions of tons. The description of the DOI alternatives is so deficient that Anaconda cannot verify the costs, volumetrics, or environmental impacts of those alternatives. Because the Laguna alternatives are nothing more than add-ons to the DOI alternatives the descriptions of those alternatives are also defective.

4. The volumetric estimates for Anaconda's 1982 plan are wrong. Apart from misinterpreting the 1982 plan, the draft's computerized volumetric estimates contain many significant errors. As a result of these errors, the draft EIS significantly overestimates the volumes of the 1982 plan. It is extremely difficult to verify the volumetric estimates for the DOI and Laguna alternatives because the draft does not provide sufficient engineering detail.

5. The radiological health effects predicted by the draft EIS are wrong. The Argonne study on which the draft relies overestimates the health effects of the "no-action" alternative by more than two orders of magnitude (i.e., a factor by more than 100). Dr. Leonard Hamilton identified this error in a recent analysis of the draft EIS. Dr. Hamilton has calculated the true radiological health risk from the no-action alternative to be about 1/100th of that reported in the draft. Because the radiological health risk that otherwise might justify reclamation is actually negligible, this error caused the Department to discard improperly the "no-action" alternative. The analysis of radiological health effects by Dr. Hamilton represents significant new information which mandates publication of a new draft EIS.

6. The safety factors for the Gavilan Mesa highwall are wrong. The draft assumes a safety factor of 1.15-1.26, and therefore erroneously concludes that the highwall is "almost certainly unstable". Seegmiller International has re-evaluated the stability of the existing highwall, and has determined that the safety factor exceeds 1.5 without any buttress material at the base of the high wall, and that the highwall is absolutely stable. This re-evaluation also constitutes significant new information requiring publication of a new draft EIS.

7. As a consequence of employing erroneous safety factors, the draft improperly concludes that the waste dumps are unstable. Seegmiller International has re-evaluated the stability of the waste dumps, and has determined that the dumps, having a safety factor in excess of 1.8-2.2, will be stable. *

8. The draft incorrectly concludes that revegetative success under Anaconda's 1982 plan would be limited to 70% of comparable undisturbed areas, evidently because Anaconda proposed an evaluation criterion of 70%. To the contrary, Anaconda anticipates full revegetation on those areas that meet the 70% evaluation criterion within three years. The 70% evaluation criterion is simply a predictor of whether the revegetation efforts will ultimately result in full vegetation comparable to undisturbed areas.

The principal purpose of a draft EIS is to accurately describe available alternatives and the environmental impacts of those alternative so that the public will have an opportunity to offer useful comments. Because of the mistakes and omissions in the Jackpile-Paguate Draft EIS, it is virtually useless as a tool to facilitate public comment and informed

Mr. Mike Pool

July 2, 1985

Page 3

decision making. Rather than attempting to develop a series of workable, innovative and cost effective reclamation alternatives, the DOI merely piles a number of evidently random increments on the already outdated 1982 plan, while utterly failing to verify the technical bases and scientific conclusions in support of these proposals.

You will soon receive from Anaconda a formal request for revision of the draft, with detailed supporting documentation of the above points. Upon review of this material we assume that you will elect to postpone the public hearing, and immediately commence preparation of a new draft EIS. If you do not choose to postpone the hearing, Anaconda will appear as scheduled, and at that time will reiterate its request, with full legal and technical support, that the DEIS be withdrawn.

Sincerely,

Meade A. Stirland

Meade A. Stirland
General Manager

mls

cc: Steve Griles, Acting Assistant Secretary
for Land and Minerals Management
Ron Solimon, Pueblo of Laguna
Bill Allen, Bureau of Indian Affairs

New Mexico Bureau of Mines & Mineral Resources

Socorro, NM 87801

A DIVISION OF
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

August 1, 1985

Mike Poole (EIS Team Leader)
USDI-Bureau of Land Management
Box 6770
Albuquerque, NM 87197-6770

Dear Mike:

Last spring, we had received your draft environmental impact statement on the Jackpile-Paguata Uranium Mine reclamation project. It took a fair amount of time to be reviewed by knowledgeable members of our staff and then was stuck in the in-box of one of our staff members who was essentially spending all of his time in the field. Thus, it has just reached my desk for summary comments.

While I realize that you are proceeding with this project and that these comments are no longer pertinent, they are sent to raise technical questions.

The principal people involved in the comments have been Virginia McLemore who has worked extensively in the area, Richard Chamberlin, who has been involved in our appraisal of uranium mines and properties throughout the state, Dave Love and John Hawley, both of whom are environmental geologists and therefore knowledgeable about those aspects, Orin Anderson, who did the original inventory of uranium mines in the state for our Open-File Report, Gary Johnpeer, our engineering geologist, and Bill Stone, our hydrogeologist, as well as comments by our mining engineer, Robert Eveleth.

Comments received include the following.

1.6 Various aspects of the geology are not quite up-to-date and are presented in a relatively uncomprehensive manner. NMBM&MR Hydrologic Report No. 6 would have been a useful reference. The long-term use of resources should not have been rejected in order to deal with questionable health hazards. The description on page 3-32 concerning armoring headcuts probably will not work in actual practice from experiences in many parts of New Mexico. On page 3-34, we wonder if alternative "filter" check dams that are proposed have actually worked in any other locality. These should be tested before they were committed to being constructed. It is very likely the gully would go around the structures.

2.2 It appears that more information is needed on how much leachate would be generated, where it would go, and how fast it would move.

3.3 The cost of the project, more than \$50 million, is obviously a tremendous drain on the tax dollars. The "no action" option is rejected in the name of public health and safety. However, the health hazard may be overstated since the 95 to 243 additional radiation-induced cancer deaths (p. VIII) caused by no action represents an increase of less than 0.1% to 0.2% in the total estimate of 135,000 natural cancer deaths (p. 3-25). It is interesting that the probable error of these estimates is not given.

Mike Poole
August 1, 1985
Page 2

9.4 We suggest that hydrologic data is needed to determine the potential dispersion of the more toxic elements such as lead, selenium, radium and arsenic (although arsenic is not mentioned in the text).

9.5 As a side discussion, it would be interesting to calculate the reduction in cancer deaths if the population of Albuquerque could be moved away from the Sandia Granite and from the alluvium derived from it (both are rich in uranium and thorium). Perhaps Albuquerque could be moved to Moriarty where the background radiation appears to be about 1/2 that of Albuquerque. Would this reduction be similar to restoring the Jackpile Mine? Both could be called removing an avoidable health hazard.

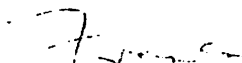
9.6 There are no base line studies prior to the commencement of mining in the 1950s, therefore it is difficult to obtain a background level. Some of the so-called contamination is very likely natural radioactivity from the rocks in the area.

9.7 If the mine is reclaimed too thoroughly, then there is probably no hopes of mining some of the remaining ore in the future. There is ore left that can be mined underground as well as by open-pit methods. According to calculations of resource and reserves, underground ore is rather extensive.

9.8 The plans mentioned restoring natural vegetation to the area and one of the comments on that is, does this also include loco weed?

Some of these comments can be summarized by saying, how can you reclaim an area when: 1) you might want to come back and mine some of the area, 2) part of the contamination is from natural outcrops, and would be there even if the tailings piles were never covered and 3) the health issues (i.e., number of deaths and illness due to radiological contamination) have not been fully documented or even completely addressed.

Sincerely yours,



Frank E. Kottowski
Director

FEK/jv

ANACONDA Minerals Company
New Mexico Operations
P.O. Box 638
Grants, New Mexico 87020
Telephone 505 875 2211



August 19, 1985

Mr. Mike Pool
EIS Team Leader
Bureau of Land Management
3550 Pan American Freeway, N.E.
P. O. Box 6770
Albuquerque, N.M. 87197-6770

Dear Mr. Pool:

Enclosed is a copy of Preliminary Comments on Jackpile-Paguate Uranium Mine Reclamation Project Draft EIS. Also enclosed is a copy of Anaconda Minerals Company 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Uranium Mine, Cibola County, New Mexico. These documents were submitted to the U. S. Department of Interior on August 16, 1985. Please include these documents in the Jackpile-Paguate Mine Reclamation EIS record.

If you have questions regarding this document or if you need additional copies, please contact me.

Sincerely,

Meade A. Stirland
Meade A. Stirland
General Manager

mls

cc: Charles Luscher
Vincent Little
Herrick Hanks
Barry Welch
William Allen
Governor C. Fernando

ANACONDA Minerals Company
New Mexico Operations
P.O. Box 638
Grants, New Mexico 87020
Telephone 505 876 2211



August 19, 1985

Mr. Herick Hanks
BLM Rio Puerco Resource Area Manager
P. O. Box 6770
Albuquerque, N.M. 87197-6770

Dear Mr. Hanks:

Anaconda hereby submits for your approval the 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Uranium Mine, Cibola County, New Mexico. The plan is an innovative, state-of-the-art approach to reclamation of the mine, which provides for multiple land uses such as grazing, water resource development, fish and wildlife habitat, recreation, and future mining use. Because this plan renders the 1982 Green Book proposal obsolete, Anaconda withdraws that proposal.

Enclosed for your convenience are five copies of the preliminary 1985 Multiple Land Use Reclamation Plan. The final version of the plan will be submitted prior to October 4. The preliminary plan, however, provides sufficient information for you to begin environmental analysis of the plan.

I am providing you, under separate cover, a copy of Anaconda's preliminary comments on the draft EIS for the Jackpile-Paguate Mine.

Please call me if you have any questions.

Sincerely yours,

Meade A. Stirland
General Manager

mls

Enclosures

ANACONDA Minerals Company
555 Seventeenth Street
Denver, Colorado 80202
Telephone 303 293 4129

C. B. Smith
Vice President
Engineering and Research

August 16, 1985

Mr. J. Stephen Griles
Assistant Secretary - Land & Minerals Management
U. S. Department of the Interior
Room 6611
18th & C Streets, N.W.
Washington, D.C. 20240

Mr. John W. Fritz
Assistant Secretary - Indian Affairs
U.S. Department of the Interior
Room 4160
18th & C Streets, N.W.
Washington, D.C. 20240

Re: Preliminary Comments on Jackpile Paguete
Uranium Mine Reclamation Project Draft EIS

Dear Mr. Griles & Mr. Fritz:

In February, 1985, the Albuquerque offices of the Bureau of Land Management and the Bureau of Indian Affairs published a draft environmental impact statement (EIS) on the Jackpile-Paguete Uranium Mine Reclamation Project. During the last five months, Anaconda Minerals Company has developed preliminary comments regarding the draft EIS, based on a careful review conducted by Anaconda legal and technical personnel, consultants originally retained to develop the Anaconda reclamation plan, and scientific experts who were requested to examine specific aspects of the draft EIS. We are submitting these comments to you because we have concluded that the draft EIS contains analytic and factual errors of such magnitude that it must be rewritten. Anaconda formally requests that you withdraw the draft EIS and require that it be completely rewritten and republished in draft form for public comment.

During the three and a half years since Anaconda submitted its March, 1982, reclamation proposal, Anaconda has acquired additional information on current conditions at the mine, the environmental impacts of the alternatives examined in the draft EIS, and available reclamation procedures. This information indicates that the 1982 reclamation proposal (known as the "Green Book") is now obsolete. Anaconda has therefore developed a new reclamation plan based on



Mr. J. Stephen Griles
Mr. John W. Fritz
August 16, 1985
Page 2

the best available information on mine conditions, state-of-the-art reclamation techniques, and the multiple use concept. Anaconda hereby submits the "Anaconda Minerals Company 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Uranium Mine, Cibola County, New Mexico" in preliminary form for approval by the Bureau of Land Management and withdraws the 1982 reclamation proposal. Anaconda will provide a complete plan prior to the end of the public comment period; however, the preliminary plan submitted today is sufficient for the Department of the Interior to begin environmental analysis of the plan.

The 1985 Multiple Land Use Reclamation Plan will (1) assure that the mine site does not pose a hazard to human health and safety, (2) provide erosion control and revegetation measures to permit grazing, (3) develop water resources for potential use as livestock watering and irrigation sources, (4) create fish and wildlife habitat, (5) provide recreational resources, (6) maintain to the maximum extent possible the potential for future mining use, and (7) enhance the scenic appearance of the area. Anaconda firmly believes that approval of this plan is in the best interest of all parties and will lead to reclamation results in which we can all take pride.

This reclamation plan far exceeds Anaconda's legal obligations to the Pueblo of Laguna and the Department of the Interior. Anaconda has carefully examined the scientific and legal bases for reclamation at the Jackpile Paguate mine and has concluded that there is no basis for the Pueblo of Laguna or the Department to compel more than minimal reclamation (such as securing underground openings and fencing the mine to prevent unauthorized entry). Nonetheless, Anaconda has chosen to offer the 1985 Multiple Land Use Reclamation Plan, which goes far beyond Anaconda's minimum legal obligations, in order to maintain its valued relationship with the Pueblo of Laguna, preserve its reputation as a responsible corporate citizen, and foster prompt agreement among the parties on a reclamation plan that can be immediately implemented.

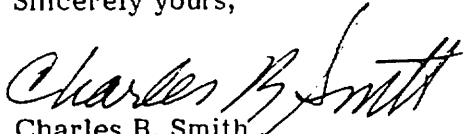
Anaconda must stress that, in considering the plan, the Department and the Pueblo of the Laguna would be ill advised to take the approach taken by the current draft EIS. i.e., senselessly adding unjustifiable and more expensive reclamation measures to Anaconda's proposal.

Mr. J. Stephen Griles
Mr. John W. Fritz
August 16, 1985
Page 3

If that approach is taken, Anaconda may reexamine the decision to voluntarily perform reclamation in excess of its minimum legal obligations.

Anaconda intends to appear at the September 10 and 11 hearings and present oral testimony regarding the draft EIS and the 1985 Multiple Land Use Reclamation Plan. Please feel free to call me at (303) 293-4129 or Meade Stirland, who is responsible for our New Mexico operations, at (505) 876-2211 with any questions you may have about our preliminary comments or the 1985 Multiple Land Use Reclamation Plan.

Sincerely yours,

A handwritten signature in cursive script, reading "Charles B. Smith". The signature is written in dark ink and is positioned above the printed name and title.

Charles B. Smith
Vice President
Exploration, Engineering & Development
Anaconda Minerals Company

RIO PUERCO RA
RECEIVED

AUG 19 1985

BUREAU OF LAND MANG
ALBUQUERQUE, NEW

PRELIMINARY COMMENTS ON THE DRAFT
ENVIRONMENTAL IMPACT STATEMENT FOR THE
JACKPILE PAGUATE URANIUM MINE RECLAMATION PROJECT

ANACONDA MINERALS COMPANY

AUG 17 1985

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EXPERT STATEMENTS

Dr. Leonard D. Hamilton, Brookhaven National Laboratory
 Dr. Douglas B. Chambers and Dr. Leo M. Lowe, SENES
 Consultants Limited
 Dr. Lyda W. Hersloff, Radian Energy Management
 Mr. Ben H. Boyd, Morrison-Knudsen Company, Inc.
 Mr. Fred C. Kelsey, Anaconda Minerals Company
 Mr. Ben L. Seegmiller, Seegmiller International
 Dr. Warren R. Keammerer, Stoecker-Keammerer and Associates
 Dr. Kenneth Ludeke, Ludeke Corporation
 Mr. Larry T. Murdock, Dames and Moore

EXECUTIVE SUMMARY

Anaconda requests that the draft environmental impact statement ("DEIS") for the Jackpile Paguate Uranium Mine Reclamation Project be withdrawn, completely rewritten and republished in draft form for public comment for the following reasons:

1. The draft is based on the erroneous legal premise that the Department of the Interior ("the Department") has unfettered discretion to impose reclamation requirements on Anaconda. In reality, Anaconda's contractual and regulatory obligations are limited to assuring that the mine does not pose a unreasonable hazard to human health and safety. Because none of the alternatives examined in the DEIS are necessary to achieve this objective, the Department lacks authority to compel Anaconda to perform them. The DEIS consistently fails to evaluate conditions at the mine in light of Anaconda's limited obligations and completely omits any discussion of how various alternatives that exceed Anaconda's obligations can be funded.

2. The draft contains enormous overestimates of the radiological health risk associated with the mine and essentially discards the no-action alternative based on these erroneous risk estimates. The estimates are too high by more than two orders of magnitude (*i.e.* more than a factor of 100). The true radiological risk is so low that no reclamation whatsoever is necessary to reduce this risk. Since the draft EIS failed to seriously address the no-action alternative because of the mistakenly perceived radiological hazard, the EIS must be revised to treat the no-action alternative as a reasonable alternative.

3. The DEIS fails to an adequate range of alternatives, including any reclamation plan less extensive than the Green Book plan or any alternative involving land uses apart from grazing. The DEIS must be revised to consider a minimal reclamation plan as well as a multiple use plan such as the 1985 Multiple Land Use Reclamation Plan being submitted today in preliminary form by Anaconda.

4. The DEIS contains numerous critical analytic and factual errors in the description of alternatives, the description of the affected environment, and the assessment of impacts, including:

- * The estimates of radiological health risk are too high by more than two orders of magnitude. The DEIS estimates that between 95 and 243 radiation-induced cancer deaths will occur in the regional population over a period of 90 years under the no-action alternative. The actual radiological health risk of the no-action alternative when adjusted for the errors

made in calculating dose-response relationship, dispersion modeling and estimating the radon and radioactive particulate release rates is approximately one additional radiation-induced cancer death in the regional population in a 90 year period. The 1985 Multiple Land Use Reclamation Plan would reduce this by a factor of three, resulting in a lifetime risk to members of the regional population of less than one in a million.

* The volumetric analysis in the DEIS erroneously concludes that there is virtually no difference in the amount of material moved under the Green Book, DOI, and Laguna alternatives and that the estimated reclamation cost of those alternatives varies less than \$3.3 million. When Anaconda requested the background documentation for these estimates, the EIS team could produce little more than a largely undecipherable computer tape and crude cost and volume calculations. Morrison-Knudsen, based on far superior data and methods, has determined that nearly 27 million cubic yards more would be moved under the Laguna plan and 5-10 million cubic yards more would be moved under the DOI monitor and drainage alternatives respectively. The difference in reclamation cost between the Green Book and Laguna plan would be about \$27 million and between the Green Book and DOI alternatives would be \$3-7 million.

* The conclusion that the Jackpile Paguate highwall will experience a rotational shear failure is simply wrong. The safety factor on the highwall, even without any modification, exceeds 1.5, which is the safety factor identified by DOI as representing absolute long-term stability.

5. The format and procedures followed in preparing the DEIS have limited its effectiveness as a decisionmaking tool and as a means to solicit intelligent public comment. The DEIS failed to identify a preferred alternative, rendering it difficult for the public to focus comments. The DEIS does not contain any cost/benefit analysis and does not even qualitatively analyze the incremental costs and benefits accruing from various features included in each alternative. While such analysis is not uniformly required under the National Environmental Policy Act ("NEPA"), it would greatly facilitate a rational choice of alternatives in this matter.

INTRODUCTION

History Of The Jackpile Paguate Uranium Mine.

The Jackpile Paguate uranium mine was established in 1951 by Anaconda Minerals Company ("Anaconda") on lands leased from the Pueblo of Laguna near Grants, New Mexico. The mine consists of three major pits (Jackpile, North Paguate, and South Paguate), several underground workings, and mine waste dumps. Mining continued at the Jackpile Paguate mine until February 1982 when Anaconda ceased all operations.

During the more than thirty years of mining activity, approximately 400 million tons of material were moved. About 22 million tons of ore were shipped for milling. The average Laguna workforce was 650 employees who earned \$85 million in wages over the life of the mine. Over \$71 million in royalties, \$200,000 in lease payments and \$2.4 million in contributions, village maintenance and repair were paid to the Pueblo of Laguna. Millions more were spent for goods and services, which benefitted all local communities.

By contrast, the New Mexico operation has constituted a net loss to Anaconda. In 1980 alone, net operating losses exceeded \$95 million. Faced with this difficult economic reality, Anaconda determined in April 1980 that mining at the Jackpile Paguate mine was no longer economically viable under current market conditions and the mine would be closed.

Development Of The Jackpile Paguate Reclamation Plan.

When Anaconda decided to cease operations at the Jackpile Paguate mine in April 1980, the Department requested that Anaconda prepare a reclamation plan by July 1980. Anaconda developed a reclamation plan for the mine as quickly as possible. This plan, known as the "Orange Book," was submitted in September 1980. The Department then began to prepare an environmental impact statement ("EIS") regarding approval of the plan.

In July 1981, Anaconda was informed of plans by Pueblo of Laguna and the New Mexico State Highway Department to relocate State Road 279 through the middle of the mine. These plans substantially altered aspects of the Orange Book plan such as access, haul routes, materials to be moved, and cost. As a result of the anticipated impact of the highway on the reclamation plan, Anaconda withdrew the Orange Book in August 1981.

After the timing of rerouting SR 279 was adjusted to accommodate reclamation, and after assessing the changes in Anaconda's regulatory obligations that resulted from the 1980 RCRA mining waste amendment, Anaconda revised the reclamation plan. The revised reclamation plan, known as the "Green Book," was submitted in March 1982.

In preparing the original Orange Book and revised Green Book reclamation plans, Anaconda was faced with a difficult task to be performed in a limited amount of time. The Orange Book was prepared under a tight deadline from the Department; the Green Book was prepared under time pressure from both the Department and the Pueblo of Laguna. No one had ever designed a reclamation plan for a uranium mine as sizable as the Jackpile Paguate. Anaconda devoted a tremendous amount of resources to developing an appropriate reclamation plan for the Jackpile Paguate mine. We have given that effort very high in-house priority. We have employed the most competent consultants available to prepare the plan and background studies and have spent more than \$3 million on the project to date.

During the three and one-half years since the Green Book plan was submitted, Anaconda has continued to acquire additional information on conditions at the mine, environmental impacts of the alternatives examined in the draft EIS, and available reclamation procedures. This information indicates that the Green Book is now obsolete. Anaconda has therefore developed a new reclamation plan based on the best available information about mine conditions and state-of-the art reclamation techniques: the 1985 Multiple Land Use Reclamation Plan. This plan is far superior to any of the alternatives examined in the draft EIS because it will provide for multiple beneficial uses of the land including grazing, water resources development, recreation, fish and wildlife habitat and future mining use. Anaconda has therefore submitted this plan for approval by the Department and withdrawn the Green Book proposal.

The Jackpile Paguate Draft EIS.

In February 1985, the Bureau of Land Management "BLM") and the Bureau of Indian Affairs published a draft EIS on reclamation of the Jackpile Paguate mine. Anaconda Minerals Company has developed these preliminary comments on the draft EIS based on a careful review conducted by Anaconda technical and legal personnel, consultants originally retained to develop the Anaconda reclamation plan, and additional scientific experts who were requested to examine specific aspects of the draft. Anaconda has concluded that the draft EIS must be withdrawn, completely rewritten, and republished for public comment for the following reasons:

First, the draft EIS is based on a faulty legal foundation. The premise underlying the draft, that the Department has unfettered discretion to require Anaconda to reclaim the mine, is completely incorrect. Anaconda has extremely limited reclamation obligations under the leases, approved mining plans, and applicable statutes and regulations. In light of current information on the environmental impact of leaving the mine unreclaimed, it is questionable whether Anaconda must

reclaim the mine at all. Anaconda nonetheless intends to perform reasonable reclamation, but will resist any attempt to impose unnecessarily burdensome or expensive reclamation requirements.

Second, significant new information compels revision of the draft EIS to consider the no-action alternative as a viable alternative. The draft is based on the 1983 Momeni report regarding radiation, which contains enormous scientific errors. Our consultants have determined that the radiological hazard from the mine is exaggerated in the 1983 Momeni report and the draft EIS by at least two orders of magnitude (i.e., 100 times too high). The correct estimate of radiological hazard is so low that no reclamation of the site is necessary to reduce the hazard. Therefore, since the draft EIS failed to seriously consider the no-action alternative primarily because of the perceived radiological hazard from the site, it must be revised to treat the no-action alternative as a reasonable alternative.

Third, the range of alternatives seriously considered in the draft EIS is wholly inadequate. The draft must be revised to fully examine a broad range of alternatives. As it stands, the draft fails to consider any alternative less extensive than the Green Book plan or any alternative involving land uses apart from grazing. Anaconda requests serious consideration be given in a revised draft EIS to both a minimal reclamation plan and to the 1985 Multiple Land Use Reclamation Plan submitted today in preliminary form. A minimal reclamation plan would comply with Anaconda's legal obligations and would reduce the already negligible risks from underground openings and other features of the mine site. The 1985 Multiple Land Use Reclamation Plan would provide for multiple beneficial use of the mine site for grazing, water resource development, recreation, fish and wildlife habitat and future mine use. This plan would protect human health and safety as well as enhance other resources at a reasonable cost.

Fourth, the magnitude of errors in both data and analysis contained in the draft EIS is so great that it must be rewritten. There are tremendous errors in the description of alternatives, the description of the affected environment with respect to radiological hazard and highwall stability, and the assessment of impacts of alternatives in terms of radiological hazard, highwall stability, and reclamation costs contained in the draft. It is so permeated with critical analytic and factual errors that mere supplementation or correction in the final EIS would be confusing and misleading to the decisionmaker and would deny the public an opportunity to comment on the realistic environmental impacts of a full range of alternatives.

The remaining sections of these preliminary comments provide a full explanation of the reasons that Anaconda believes the draft EIS must be rewritten. Section II of these preliminary comments discusses further Anaconda's limited legal obligations. Section III explains the additional scientific evidence that the mine site does not pose a radiological health risk and why that evidence mandates serious consideration of the no-action alternative. Section IV indicates further why the range of alternatives must be expanded to include a minimal reclamation plan and the 1985 Multiple Land Use Reclamation Plan. Section V details the factual, analytic and procedural errors in the draft EIS.

Attached to the preliminary comments are the statements of a number of scientific experts, which form the basis of these comments, including Dr. Leonard D. Hamilton of Brookhaven National Laboratory (radiation); Dr. Douglas B. Chambers and Dr. Leo M. Lowe of SENES (radiation); Dr. Lyda W. Hersloff of Radiant Energy Management (radiation); Mr. Larry T. Murdock, P.E., of Dames and Moore (surface and groundwater hydrology, erosion control); Dr. Ben L. Seegmiller of Seegmiller International (geotechnical engineering, stability); Mr. Ben H. Boyd, of Morrison-Knudsen (volumetrics); Dr. Warren R. Keammerer of Stoecker-Keammerer and Associates (vegetation); Dr. Kenneth L. Ludeke of the Ludeke Corporation (vegetation); Mr. Fred C. Kelsey of Anaconda Minerals Company (volumetrics).

Several of these experts have prepared detailed reports on which their statements are based. These reports are currently in draft form and will be made available to the Department as they are completed, which should be prior to the close of the public comment period.

II. THE DRAFT EIS IS BASED ON AN ERRONEOUS ASSUMPTION ABOUT THE EXTENT OF THE DEPARTMENT'S AUTHORITY TO COMPEL RECLAMATION

10-1 The draft EIS is fundamentally flawed by the underlying premise that the Department has authority to compel Anaconda to perform whatever reclamation it deems appropriate. Although the draft EIS claims to remain neutral concerning the applicability of the BIA mineral leasing regulations (25 C.F.R. Part 211), the BIA mining and reclamation regulations (25 C.F.R. Part 216), and the BLM operating regulations (43 C.F.R. Part 3570) [see DEIS at 1-6], the draft in fact assumes that the Department could compel performance of any of the alternatives examined in the draft. Otherwise, the discussion in the draft of the alternatives would have examined the feasibility of securing sufficient appropriations or otherwise financing reclamation beyond the amount that Anaconda is legally required to perform.

Anaconda's Contractual Reclamation Obligations Are Limited.

Anaconda has limited reclamation obligations under the prospecting permit and the 1952 and 1963 leases. In contrast to the 1976 lease (on which no mining occurred), the prospecting permit and 1952 and the 1963 leases impose no express reclamation obligations.^{1/} While not strictly "reclamation" obligations, Section 13 of the prospecting permit and Section 16 of the 1963 lease require that Anaconda leave the property in a condition that is not hazardous to life or limb. Thus, Anaconda has an obligation to assure that the mine site will not pose an unreasonable hazard to human health or safety.

The leases also contain a variety of provisions that require proper mining practice, prevention of waste, and return of the property in good condition. For example, Section 3 of both the 1952 and 1963 leases requires Anaconda to "carry on development and operations in a workmanlike manner." Both leases prohibit Anaconda from committing "waste" on the land. Section 3 of the 1952 and 1963 leases requires return of the property in as good condition as received, except for ordinary wear and tear and "incidents" or "accidents" from proper mining. The obligation imposed by all of these provisions is limited to conducting operations in accordance with good mining practices. Since there is no evidence that the mine was not mined in accordance with good mining practices, no reclamation can be justified on this basis.

Section 16 of the 1963 lease requires that Anaconda "make provisions for the conservation, repair, and protection of the property." All lease provisions must be construed in light of the intent of the parties and the custom and usage of the industry at the time the leases were executed. Gladys City Co. v. Amoco Production Co., 528 F. Supp. 624 (D.Tex. 1981); Watkins v. Petro-search, Inc., 689 F.2d 537 (5th Cir. 1982). There is no evidence that the parties contemplated reclamation in including this provision. The common industry meaning of the terms of this provision did not encompass reclamation.

^{1/} The DEIS suggests that mining occurred on lease #8, issued in 1976. DEIS at 1-1. In fact, no open pit or underground mine operations took place on that lease. The only activities on lease #8 were roads, exploratory drilling, and limited experimentation with an in situ solution process. The roads have been already reclaimed with the exception of the main road and the drill holes associated with the exploratory drilling and experimental solution mining have been properly plugged and the area revegetated. All reclamation obligations associated with lease #8, apart from reclaiming the main road, have already been discharged.

Where parties intended to require reclamation, specific reclamation clauses were included in the lease. See, e.g., Hitchcock v Peter Kiewit & Sons Co., 479 F.2d 1257 (10th Cir. 1973) (construing 1968 specific reclamation clause); Peavy House v. Garland Coal & Mining Co., 382 P.2d 109 (Okla. 1962), cert. denied, 375 U.S. 906 (1963) (interpreting 1954 specific reclamation clause). Thus, this section should not be construed to require reclamation of the mine site.

In summary, the only obligation clearly imposed by the 1952 and 1963 leases that might require some post-mining activity is the obligation to leave the mine site in a condition that does not pose an unreasonable hazard to human health or safety.

Anaconda's Regulatory Obligations Are Also Limited.

10-1 (Cont.) Neither the BIA mineral leasing regulations (25 C.F.R. Part 211) nor the BIA reclamation regulations (25 C.F.R. Part 216) impose any specific reclamation obligations on Anaconda. The BIA mineral leasing regulations merely require the lessee to conduct operations in accordance with good mining practice (25 C.F.R. § 211.19) and do not impose any specific reclamation obligations. The BIA reclamation regulations do not apply to the mine because they specify that they apply "only to permits or leases issued subsequent to the date on which these regulations become effective." 25 C.F.R. § 216.2(c). Because the leases were issued prior to the effective date of the regulations (Jan. 18, 1969), the regulations do not apply to Anaconda's operations.

The current BLM operating regulations (43 C.F.R. Part 3570) which prescribe general obligations of lessees, do apply to the mine. These regulations prescribe general obligations of lessees. Section 3571.1(a) requires the lessee to take steps to prevent injury to life or health. Section 3571.1(b) requires:

(b) Lessees and permittees shall take such action as may be needed, to avoid, minimize, or repair soil erosion; pollution of air; pollution of surface or ground water; damage to vegetative growth, crops, including privately owned forage, or timber; injury or destruction of fish and wildlife and their habitat; creation of unsafe or hazardous conditions; and damage to improvements, whether owned by United States, its permittees, licensees or lessees, or by others; and damage to recreational, scenic, historical, and ecological values of the land. The surface of leased

or permit lands shall be reclaimed in accordance with the terms and conditions prescribed in the lease or permit and the provisions of the approved exploration or mining plan. Where any question arises as to the necessity for or the adequacy of an action to meet the requirements of this paragraph, the determination of the authorized officer shall be final subject to the right of appeal as provided in § 3000.4 of this title.

Section 3571.1(b) does not impose any specific reclamation obligations. Any implied obligation to "repair" natural resource damage would be limited by notions of reasonableness including technical feasibility and a reasonable relationship between reclamation costs and environmental benefits. It would also be limited by the specific reclamation language contained in the second sentence of Section 3571.1(b), which specifies that "[t]he surface of leased or permit lands shall be reclaimed in accordance with the terms and conditions prescribed in the lease or permits and the provisions of the approved exploration or mining plan." Since the leases do not specifically require reclamation, and there are no specific reclamation obligations in the approved mining plans (apart from the provision in the PW2/3 underground mining plan), Section 3571.1(b) does not require reclamation.

The PW2/3 mining plan provides for backfilling the west portion of North Paguate pit to a specific elevation and then sloping the backfill material to the central portion of the pit at the angle of repose. Implementation of this requirement would cost approximately \$1.6 million and would result in no significant environmental benefit. It is Anaconda's position that enforcement of the provisions of the PW2/3 plan under these circumstances would be arbitrary and capricious.

Even if Part 3570 provided authority to require reclamation, that authority would be limited to reclamation necessary because of operations after the effective date of the operating regulations (July 1, 1972). There is no indication that the 1972 operating regulations were intended to apply retroactively to operations undertaken prior to their effective date. Retroactive application of those regulations would unfairly undercut Anaconda's reasonable reliance that its operations would be governed by its leases and the former operating regulations and, therefore, would violate Anaconda's due process rights. Heckler v. Community Health Services of Crawford County, U.S. _____, 81 L.Ed. 2d 42, 104 S. Ct. 2218 (1984); Retail Wholesale, and Department Store Union v. N.L.R.B., 466 F.2d 380 (D.C. Cir. 1972).

10-1(Cont.)

10-1(Cont.)

The Geological Survey operating regulations (30 C.F.R. Part 231) in effect prior to the 1972 regulations did not impose any specific reclamation requirements. While they did require proper "disposal" of mine waste (30 C.F.R. § 231.25), that term must be construed in light of the then prevailing understanding of the term "disposal," which did not include reclamation. There is no reason to believe the former operating regulations contemplated reclamation.

In summary, the only regulatory obligations of Anaconda that even arguably require reclamation are those contained in (1) the provisions of the approved mining plan for PW2/3 and (2) possibly the provision in the first sentence of 43 C.F.R. § 3571.1(b) regarding "repair" of natural resources. The next section will discuss whether the 1985 Multiple Land Use Reclamation Plan being submitted today for approval complies with Anaconda's contractual obligations and regulatory obligations.

The 1985 Multiple Land Use Reclamation Plan More Than Complies With Anaconda's Limited Contractual And Regulatory Obligations.

10-2

Anaconda has an unequivocal responsibility to ensure the mine site does not pose an unreasonable risk to human health or safety. The information received from Anaconda's technical personnel and scientific consultants indicates that (1) the mine, even if left wholly unreclaimed, does not pose any significant radiological health risk; (2) the Jackpile, North Paguate, and South Paguate highwalls in their present condition do not pose any significant risk to human safety; (3) the protore and waste dumps even if left unreclaimed will not pose any significant risk to human health or safety; (4) the Plan will eliminate any potential safety hazard from underground openings or subsidence; (5) the mine site even if left unreclaimed will not pose any significant risk of contaminating drinking water sources and thus will not pose a hazard to human health; and (6) the mine site does not violate any applicable air quality standards and thus will not pose a hazard to human health. On this basis, we conclude that the 1985 Multiple Land Use Reclamation Plan more than complies with Anaconda's obligation to assure the mine site is not left in a hazardous condition. This conclusion turns on the assumption that neither the leases nor the BLM operating regulations authorize BLM to require Anaconda to further reduce extremely small risks to human health at unjustifiably great expense.

Even if Part 3570 were interpreted to impose an obligation to "repair" certain sorts of natural resource damage, the 1985 Multiple Land Use Reclamation Plan would still satisfy that obligation. According to Anaconda's experts, the Plan will (1) vastly reduce soil erosion by resloping protore piles and waste dumps, armoring waste dumps, installing water harvesting berms, extensive revegetation and moving protore and waste out

10-2 (Cont.)

of the 100 year flood plain; (2) prevent any significant amount of post-reclamation air pollution or pollution of surface or ground water; (3) ultimately result in vegetation as productive as the surrounding area; (4) restore and enhance virtually all fish and wildlife habitat, thus eliminating any injury to fish and wildlife; and (5) retain and restore the historical, recreational, scenic and ecological values of the land. Little, if any, incremental environmental benefit would occur from reclamation efforts apart from those proposed in the Plan. Anaconda believes that the land forms that will result from the Plan are similar to and compatible with the surrounding terrain and will not detract from the scenic values of the area. While reasonable men may differ with respect to the Plan's effect on scenic values of the land, it is clear that the enormous reclamation expenditures at the mine site necessary to achieve the land forms suggested by the DOI, Laguna and 1982 Green Book alternatives cannot be rationally justified on aesthetic grounds.

In conclusion, Anaconda's only clear-cut contractual and regulatory obligation is to assure that the mine site be left in a condition that does not pose an unreasonable risk to human health or safety; the 1985 Multiple Land Use Reclamation Plan proposed by Anaconda more than fulfills that obligation.

III. THE DRAFT ENVIRONMENTAL IMPACT STATEMENT IMPROPERLY DISCARDED THE NO-ACTION ALTERNATIVE

A. The Draft EIS Discarded The No-Action Alternative Based On The Erroneous Assumption That The Unreclaimed Mine Site Would Have Serious Radiological Health Impacts.

10-3

The draft EIS eliminates the no-action alternative from consideration as infeasible because it "would not provide a reasonable measure of protection to public health and safety, and does not reduce environmental impacts to the extent possible." DEIS at 1-11. The determination that the no-action alternative is infeasible is clearly based on the assumption that the mine site constitutes an unreasonable hazard to public health and safety, since none of the alternatives considered in the draft would reduce environmental impacts to the amorphous "extent possible." The expert statements submitted today by Anaconda demonstrate that the mine site does not represent an unreasonable hazard.

The most significant hazard alleged in the draft EIS is the radiological health hazard. The draft states that, if left unreclaimed, the mine would cause between 95 and 243 additional cancer deaths (DEIS at 3-25) in the regional population over a 90-year period. Obviously, this reported radiological health risk hazard dwarfs all other hazards at the site. While other hazards are identified, such as unstable highwalls, unstable

10-3(Cont.)

waste dumps, possible subsidence, and underground openings (DEIS at 1-19), the draft does not predict any deaths or injuries from these conditions, but only notes the remote possibility of such injuries. The draft notes, for example, that the probability of rockfall or highwall failure occurring at the exact moment when humans or livestock are present is "extremely low." DEIS at 3-4. While the draft notes that the highwalls are an attractive nuisance, it concedes that "there have been few reports of people going near the highwalls." DEIS at 3-4. Even so, the no-action alternative described in the alternatives chapter would include securing the area to prevent unauthorized entry (presumably by fencing the unfenced highwalls and any ready access points). DEIS at 1-11. The draft mentions a "possibility" that a sudden change in elevation due to subsidence could result in injury to humans or livestock standing immediately above the decline area. DEIS at 3-10. However, the draft does not make even a qualitative assessment of that risk. The draft also mentions that underground openings pose a physical risk to people and livestock, but does not make any assessment of the magnitude of that risk. DEIS at 3-12. Clearly, the determination that the no-action alternative poses an unreasonable risk to public health and safety depends on the radiological health risk reported in the draft EIS.

B. The Draft EIS Grossly Exaggerates The Radiological Health Risk From The Unreclaimed Mine Site.

The radiological health risk estimated by the draft EIS is quite simply and undisputably erroneous.

10-4

The statements concerning radiological health risk in the draft EIS are based solely on a report prepared by Momeni, et al. (1983).^{2/} DEIS at 3-13. The 1983 Momeni report is wrong. While it purports to base the health effects calculations on the recognized dose-response rates of BEIR III (NAS 1980), the implied dose-response rates in the 1983 Momeni report are as much as three orders of magnitude too high (i.e., a factor of 1000) for certain types of cancer. Hamilton statement at 5. This error alone results in overall calculations of radiological health effects that are at least 100 times higher than any responsible estimate. Hamilton statement at 5; Chambers and Lowe (SENEC) statement at 4-4. It must be stressed that this is an error, not a matter of differing expert opinions. It is a serious, uncontestable mistake, probably caused

^{2/} The member of the EIS team responsible for the radiation issue served merely as a technical coordinator. He was not qualified by education or training to provide any independent assessment of radiological health risks. DEIS at 4-7.

by use of an unvalidated computer code to calculate the radiological health effects. ^{3/}

The attached statements authored by Dr. Leonard Hamilton of Brookhaven National Laboratory and Drs. Douglas Chambers and Leo Lowe of SENES explain this error more fully. It should be noted that this error has also been identified by governmental reviewers of the Momeni study. Drs. Michael Ginevan and Jerome Puskin of the Health Effects Branch, Division of Health, Siting, and Waste Management, Nuclear Regulatory Commission notified Dr. Momeni of this error in April 1983. See Attachment B to Dr. Hamilton's statement. There can be no scientific doubt that the 1983 Momeni report, by this error alone, has tremendously exaggerated the radiological health risks of the no-action alternative.

10-4(Cont.)

Apart from the erroneous dose-response rates, the 1983 Momeni study contains at least two other clear errors. First, the estimate of radon releases is 1.8 times too great and the estimate of radioactive particulate emissions is 2.4 times too great because Momeni erroneously assumed that radon and radioactive particulates are emitted from 100% of the gross acreage of the mine. In reality, only the acreage covered with radioactive material (Jackpile sandstone) emits radon or radioactive particulates above normal background. Dr. Lyda Hersloff of Radiant Energy Management has calculated the actual radon releases to be 57% of the releases assumed by Momeni and approximately 42% of the radioactive dust releases assumed by Momeni. Hersloff statement at 2-3. Second, as explained by Drs. Hamilton, Chambers and Lowe the UDAD computer code used to translate environmental releases of radiation into human radiation doses contains many errors. Hamilton statement at 7-10; Chambers and Lowe statement at 3-1 to 3-4. Among those errors is a substantial overestimate of the exposure of nearby individuals. Dr. Hamilton indicates that the exposure to nearby individuals is overestimated by at least a factor of 1.6. Hamilton statement at 10. Because these errors are multiplicative, not additive, the 1983 Momeni report and the draft EIS likely overestimate the radiological health effects of the no-action alternative by a factor of 200. Chambers and Lowe statement at 4-4.

3/ The health effects were estimated using a computer code "Potential Radiation-Induced Biological Effects in Man (PRIM)" developed by Dr. Momeni. The Momeni report cites two references to the PRIM code. The first was apparently never completed. The second is the paper given by Dr. Momeni in Albuquerque, which was severely criticized by Drs. Ginevan and Puskin. See Attachment B to Dr. Hamilton's statement.

C. The Actual Radiological Health Risk From The Unreclaimed Mine Site Would Be Insignificant.

10-4 (Cont.)

Drs. Hamilton, Chambers and Lowe have recalculated the actual radiological health risks from the unreclaimed minesite, using the overly conservative assumptions contained in the draft EIS correcting only the computational errors found in the implied dose-response rate. Dr. Hamilton has calculated that the no-action alternative would allow at most three radiation-induced cancer deaths in the entire regional population over a period of 90 years. Hamilton statement at 12. Drs. Chambers and Lowe have independently estimated the radiological health effects of the no-action alternative at one radiation-induced cancer death in the regional population over a period of 90 years. Chambers and Lowe statement at 4-3. Drs. Ginevan and Puskin have indicated that the correct number of deaths, using Momeni's reported methodology, is 2.5 under the absolute risk model and 6.0 using the relative risk model. See Attachment B to Hamilton statement. Dr. Ginevan and Puskin, of course, were not aware of the error in calculating the level of radon and radioactive particulates, and did not examine possible errors arising from the use of UDAD. If the errors in UDAD and the source term are taken into account, it is clear that the no-action alternative would allow substantially less than one radiation-induced cancer death in the regional population over a 90 year period. Chambers and Lowe statement at 5-2. This compares to the nearly 135,000 natural cancer deaths in the regional population during the same period.

As mentioned above, the methodology Momeni utilized to calculate health effects contained certain overly conservative assumptions, apart from the obviously erroneous dose-response estimates, erroneous radon and radioactive particulate emission rates, and erroneous dispersion estimates in the UDAD code. These conservative assumptions are explained by Dr. Hamilton. Hamilton statement at 10-12.

The question that remains is whether the actual radiological health risk from the no-action alternative constitutes an unreasonable hazard to public health and safety. The draft EIS indicates that the 95-243 cancer deaths in the regional population over a 90 year period incorrectly attributed to the no-action alternative are an unacceptable health risk. However, the draft also implicitly suggests that the actual radiological risk of a single cancer death is not unacceptable because the actual risk under the no-action alternative is substantially less than the risk supposed by the Department for the 1982 Green Book, DOI, and Laguna alternatives. The draft estimated that the Anaconda, DOI and Laguna alternatives would reduce the radiological health risk to roughly 10% of the lung cancer deaths anticipated by Momeni under the no-action

alternative. DEIS at 3-25. Since the number of lung cancer deaths predicted by Momeni under the no-action alternative ranged from 9 to 46 (1983 Momeni report at 4-12, 4-13), the draft EIS assumed that there would be up to 4.5 additional cancer deaths even after reclamation under the Anaconda, DOI and Laguna alternatives. Nowhere in the draft EIS did the Department suggest that such a risk represented an unacceptable hazard to human health and safety.

10-4 (Cont.) The possibility of even one additional cancer death in the regional population over a 100 year period might seem to be an unjustifiable risk. In a perfect world with unlimited resources, the Department might endeavor to eliminate all radiological and other health risks. However, as all parties must concede, that is not a realistic approach to risk management at the Jackpile Paguate mine or elsewhere. Instead, we must determine what constitutes an acceptable radiological health risk largely by comparison with other health risks considered acceptable in other contexts. When compared to other health risks, the radiological health risks from the Jackpile Paguate mine site are truly insignificant. For example, the draft EIS notes that 135,000 natural cancer deaths are expected in the regional population during the next 90 years. If one cancer death resulted from the no-action alternative, this would represent a .00075% increase in cancer deaths. Put another way, the lifetime risk to an individual in the regional population of dying from radiation at the mine site, if it is left unreclaimed, is approximately one in a million.

Dr. Hamilton's statement puts radiological health risk from the mine site in excellent perspective. Even if the errors in the source term and in the dispersion modeling are left uncorrected, the actual risk is of dying from cancer caused by living in the vicinity of the mine is only 1.5% of the risk of dying of radiation from the excess cosmic rays in Denver compared to New York. Similarly, it is about 1.5% of the risk of dying from radiation received by living in a granite building rather than a wood building. Obviously, our society has not determined that the radiological health hazards of living in Denver compared to living in New York City or in granite buildings are unacceptable, even though those hazards are at least 70 times greater than the radiological health hazards of the Jackpile Paguate mine site under the no-action alternative. Thus, there is no rational basis for the draft EIS to discard the no-action alternative based on the radiological health risks associated with the mine site.

D. The Draft EIS Must Be Completely Revised To Reflect The Fact That The No-Action Alternative Is Feasible.

10-5 Major portions of the draft EIS must be revised in order to discuss accurately the radiological health risks from the

no-action alternative and other alternatives. The heart of the draft EIS is the discussion of alternatives in Chapter 1 and of environmental consequences in Chapter 3. The entire discussion of radiation in Chapter 3 (DEIS at 3-12 to 3-27) must be totally rewritten. In addition, the discussion of the no-action alternative (DEIS at 1-11) and the summary of impacts (DEIS at 1-27) in Chapter 1 must be rewritten. Supplementation of the draft EIS, whether by a complete revision of the draft or publication of a supplemental EIS, is mandatory. 40 C.F.R. § 1502.9(c)(ii). See, e.g., Sierra Club v. U.S. Army Corps of Engineers, 701 F. 2d 1011 (2d Cir. 1983); Conservation Law Foundation v. Watt, 560 F.Supp. 561 (D. Mass. 1983).

10-5(Cont.)

Anaconda believes that mere supplementation with respect to these chapters is not sufficient. The entire analysis contained in the draft EIS is tainted by the mistaken assumptions that there are serious radiological health risks associated with the mine site and that the no-action alternative is not feasible. Where the draft EIS was prepared on the basis of such critical and totally mistaken assumptions, the Department should step back and take another "hard look" at which alternatives should be analyzed, what the environmental impacts of those alternatives would be, and at what reclamation efforts should be undertaken at the Jackpile Paguate mine.

IV. THE RANGE OF ALTERNATIVES CONSIDERED IN THE DRAFT EIS IS INADEQUATE

NEPA and the Council of Environmental Quality (CEQ) implementing regulations require that an EIS must contain a detailed statement of alternatives to the proposed action. 42 U.S.C. § 4332(2)(C)(iii); 40 C.F.R. § 1502.14(a). In interpreting this provision, the CEQ has stated that "when there are potentially a very large number of alternatives, only a reasonable number of alternatives, covering the full spectrum of alternatives, must be analyzed and compared in the EIS." 46 Fed. Reg. 18026, 18027 (1981) (emphasis in the original).

10-6

On its face, the draft EIS does not consider a full spectrum of alternatives. The draft considered only the 1982 Green Book plan and the DOI and Laguna variations of that plan. It did not seriously consider the no-action alternative. It did not consider any alternative less extensive than the 1982 Green Book, which biases the draft by skewing the range of alternatives toward more extensive alternatives. See e.g., California v. Block, 690 F.2d 753 (9th Cir. 1982) (agency cannot restrict and thus skew the range of alternatives). It also failed to consider any alternative that would result in post-reclamation land uses other than grazing, even though other land uses such as future mining were suggested during scoping. See, e.g., Conservation Law Foundation of New England v. GSA, 707 F.2d 626 (1st Cir. 1983) (EIS inadequate because it failed to consider

alternatives resulting in land uses other than residential). The Agency cannot omit consideration of such alternatives merely because they would only achieve some of the goals set by DOI. See, e.g., NRDC v. Morton, 458 F.2d 827, 836 (D.C. Cir. 1972); Town of Matthews v. DOT, 527 F.Supp. 1055 (W.D.N.C. 1981).

10-6(Cont.) The draft EIS should be revised to include a complete and unbiased analysis of at least two other alternatives. The first alternative is a minimal reclamation plan that would have the limited goal of reducing any health and safety risks associated with the mine site. While there are no appreciable health and safety risks under the no-action alternative, there are several steps beyond no-action that might further reduce the very small risks that do exist. Although Anaconda believes that the current state of the mine site is safe enough to meet its legal obligations, some of these measures might be reasonable and cost-effective. Such a plan might include plugging drill and vent holes, blocking off underground openings, fencing the entire mine, rerouting roads away from highwalls and providing security patrols to prevent unauthorized entry. A trust fund to ensure maintenance and security might be provided in such a plan. Anaconda estimates that a minimal reclamation plan would cost approximately \$2.2 million. Anaconda believes that such a plan fully complies with the legal obligations previously outlined in Section II, other than the reclamation requirement contained in the mining plan for PW2/3 (which Anaconda considers wholly unreasonable in light of the environmental benefits and reclamation costs associated with that requirement). Consideration of a minimal reclamation plan would broaden the spectrum of alternatives to include at least one alternative less extensive than the 1982 Green Book.

The second alternative is the 1985 Multiple Land Use Reclamation Plan submitted by Anaconda in preliminary form today. This plan would provide for a variety of land uses in addition to grazing, including water resource development for possible livestock watering or irrigation, fish and wildlife habitat, recreation and future mining use. Analysis of this plan would broaden substantially the range of alternatives considered in the draft EIS.

Anaconda believes that the 1985 Multiple Land Use Reclamation Plan represents a far superior approach to reclamation at the Jackpile Paguate site and renders the 1982 Green Book obsolete. Anaconda therefore withdraws the 1982 Green Book proposal and formally submits the 1985 Multiple Land Use Reclamation Plan to the Bureau of Land Management for approval.

V. THE DRAFT EIS CONTAINS FACTUAL AND ANALYTIC ERRORS OF SUCH MAGNITUDE THAT IT MUST BE WITHDRAWN, REWRITTEN, AND REPUBLISHED IN DRAFT FORM

The draft EIS contains tremendous factual and analytic errors. The description of alternatives contained in the draft EIS is inadequate. The draft inaccurately describes the 1982 Green Book plan and simply fails to describe the DOI and Laguna alternatives in sufficient detail to permit intelligent comment. There are substantial errors in the description of the affected environment with respect to radiological hazard, highwall and waste dump stability, revegetation, and the current conditions of the underground mines. The assessment of impacts of alternatives is fraught with inconsistencies and outright factual and analytic errors.

The draft cannot be simply corrected in the final EIS because the public would be denied the right to comment on a reasonably accurate assessment of the alternatives. The magnitude of these collective errors also makes mere supplementation unwise because much of the draft requires correction and supplemental information. The only appropriate way to remedy the problems of the current draft is to withdraw, rewrite, and republish a new draft for the public comment.

A number of the specific factual and analytic errors are discussed below.

A. Inaccuracies In The Description Of The 1982 Green Book Proposal.

10-7 The draft EIS misrepresents a number of significant features of the 1982 Green Book plan. The description of that plan is misleading to the public and the decisionmaker, who must attempt to compare it to other alternatives based on the inaccurate description. For example, the draft contains a number of inaccuracies concerning highwall treatment. Contrary to the references in the draft (DEIS at vi, ix, 1-11, 1-14, 1-26, 1-27), Anaconda's 1982 plan did not propose to blast the Gavilan Mesa highwall; Anaconda proposed buttressing to stabilize the wall. The draft fails to mention Anaconda's fencing of the North Paguate highwall. DEIS at 1-14. The draft altered the safety factor calculations for the 1982 Green Book, thus misrepresenting the safety factors proposed by Anaconda. DEIS at 3-5.

10-8 The post-reclamation slope geometry of the waste dumps proposed in the 1982 Green Book is also misrepresented. DEIS at vi, 1-11, 3-9, 3-10. The Green Book proposed to slope all dumps interior to pits at 3:1 or flatter. Fifty percent of dump slopes exterior to the pit would be 3:1 or flatter. For example, parts of V, South Dump, FD-1 and all backfill slopes

10-8
(Cont.) are 3:1 or flatter, which is not recognized in the draft. DEIS at 3-10.

10-9 The draft also fails to mention other erosion control measures proposed in the Green Book, such as rock cover on slopes and surface erosion control features such as land imprinting surface water control berms systems, berms on dump crests, and reduction of slope lengths. DEIS at vi, ix, 1-11, 1-14, 1-26, 1-27. The draft erroneously indicates that Anaconda plans to buttress FD-2. The draft also did not properly interpret the terrace design proposed in the Green Book. The terraces would not allow standing water, but would drain water to prevent piping. DEIS at 3-10.

In addition, the description of Anaconda's proposal is based on a fundamental misinterpretation of the Green Book with respect to movement of dump materials. This misinterpretation is evident from the statements in the draft EIS that Anaconda had not indicated what it would do with excess material from waste dump resloping. DEIS at vi. The draft assumed that the waste dump resloping would result in 19 million cubic yards excess when in fact there would be limited excess (which is a result of the extremely conservative approach taken in the Green Book). DEIS at vii.

B. Inadequacies Of The Descriptions Of The DOI And Laguna Alternatives.

10-10 The description of the DOI and Laguna alternatives do not contain sufficient information to permit professional evaluation of the accuracy of the analysis of impacts of those alternatives. The information previously requested by Anaconda on March 28, 1985 is the sort of detailed technical information necessary to evaluate the alternatives. Summary reports containing this information should have been published as appendices or open file reports to accompany the draft EIS.

10-11 There is also insufficient detail in the descriptions of the DOI and Laguna alternatives to permit intelligent comment. For example, the draft does not specify monitoring techniques or criteria for the DOI monitor option. The draft does not contain a detailed design of the DOI drainage option or the Laguna option. Details concerning the DOI waste dump slope design, such as the convex slope toe requirement (DEIS at 1-15, 1-22), are not provided. The description of the Laguna alternative does not indicate sources and materials of additional backfill to allow protore to be placed above groundwater recovery level. DEIS at 1-15.

10-12 Even when Anaconda made a detailed information request after publication of the draft EIS, the Department did not provide adequately detailed information. For example, the

10-12(Cont.) computer tapes, which contained the base mapping, were incorrect and virtually unusable. Data for the post-reclamation mapping, necessary to verify the BLM volumetric calculations, was never provided. The design maps provided were sloppy and did not have coordinate systems. The volumes in the cost and volumes report were inaccurate and inconsistent. The cost estimates were extremely rough and the underlying assumptions used to calculate costs were not adequately justified. The problems in securing and interpreting this data as well as some of the errors found in this data are detailed in the attached statement of Fred Kelsey.

10-13 The response to Anaconda's information request made it clear that the DOI alternatives were little more than back of the envelope concepts when the draft EIS was written. Anaconda was told that neither the DOI drainage option nor the DOI headcutting design were "on paper" when Anaconda's request was made, nearly a month after publication of the draft EIS.

C. Inaccurate Factual Statements About Baseline Conditions.

10-14 One of the most significant errors in the description of the affected environment concerns the Gavilan Mesa highwall. The draft EIS erroneously assumes that a safety factor of 1.15-1.26 and states that the Gavilan Mesa highwall is "only marginally stable" (DEIS at 2-21), and later describes it as "almost certainly unstable." DEIS at 3-4 These statements, as demonstrated by the stability data previously submitted by Anaconda, are erroneous. Anaconda recently commissioned an additional study of the stability of the Gavilan Mesa highwall. That study (Seegmiller 1985) concluded that, even using extremely conservative assumptions about the strength of the various rock strata, the safety factor for the highwall exceeds 1.5 and the highwall is definitely stable. Seegmiller statement at 8. Had the EIS team responsible for preparing the draft properly analyzed the previously submitted stability data or had they conducted a complete independent analysis, they would have reached this conclusion. However, no such effort was undertaken. The Seegmiller study constitutes significant new information that must be discussed in a revised EIS. 40 C.F.R. § 1502.9(c)(ii).

10-15 The radiation section is replete with erroneous statements. The most significant error, the error in the dose-response relationship found by Dr. Hamilton and verified by Dr. Chambers, is discussed above. Another significant error is the statement that the total radon release rate is 5,588 Ci/yr. DEIS at 2-36. This rate appears to have been calculated assuming that the entire mine site was emitting radon at a rate comparable to exposed uranium enriched material (Jackpile sandstone). In actuality, only those areas of the mine site

10-15(Cont.) containing exposed and mineralized Jackpile sandstone emit radon and the total radon release rate is 3206 Ci/yr., or approximately 57% of the release rate reported in the draft EIS. An even greater error was made in calculating the release of radioactive dust: the actual release of radioactive dust is only 42% of that reported by Momeni. The total radon and radioactive dust release rates were calculated by Dr. Lyda Hersloff based on data submitted to, but apparently not correctly used by, the EIS team and their consultants. The Hamilton, Chambers and Lowe, and Hersloff studies are also significant new information that must be discussed in a revised EIS.

10-16 The draft contains a number of other erroneous statements concerning radiation at the mine site. It incorrectly states radon exhalation rates and uranium activity. DEIS at 2-4. Anaconda gravimetric readings were erroneously converted to radiological data. DEIS at 2-36. The draft improperly attributes high gamma readings and radioactive sediment to mining activity, which were actually the result of natural pre-mining conditions. DEIS at 2-29, 2-32, 2-35. Some of the basic radiation information contained in the draft is also incorrect. The shielding effects depend on soil and gamma ray energy and cannot be expressed as a simple percentage. DEIS at 2-31. The draft fails to mention that ingested uranium is readily excreted. DEIS at 2-31, 2-47. These errors substantially affect the estimates of radiological health effects from the mine site.

10-17 The draft EIS contains numerous misstatements concerning the current conditions of the waste dumps. The draft erroneously identifies areas subject to headcutting (DEIS at 1-15), because two areas, one south of Y dump and one west of FD3 dump, no longer have a source of water that would cause headcutting. It also states incorrectly that Anaconda has attempted to armor headcuts. DEIS at 3-22. The draft improperly concludes that Anaconda's matting and special seeding techniques were unsuccessful. DEIS at 2-14, 2-61. Anaconda has submitted substantial data in past annual reports that disproves this statement. The draft inaccurately describes certain areas on dump V as slide scars (DEIS at 2-23); these actually are areas where material was removed by loader to repair nearby roads. Any conclusion that dump V or other dumps may be unstable due to these "slide scars" is obviously erroneous.

10-18 The draft also contains a number of incorrect statements about the underground mines, most of which tend to exaggerate the hazard from current conditions at the mine. For example, all underground entries are already barricaded, not open. DEIS at 1-18, 2-26. P-15/17 was never finally approved by the Pueblo of Laguna, was never developed, and is not accessible, contrary to statements in the draft. DEIS at viii, 2-13. The

10-18(Cont.) description of adit and decline sealing is inadequate and does not address H-1, NJ-45 and other underground access points. DEIS at 1-18. P-13 is submerged and flooded, and therefore not accessible. DEIS at 2-12. The estimated subsidence at P-10/7 is erroneous because one survey point was set on loose highway fill and erosion has allowed the survey station to move downhill. DEIS at 2-23.

D. Errors In The Analysis Of Environmental Impacts.

1. Radiation

10-19 Some of the most critical errors in the draft are errors in the analysis of the radiological impacts of the no-action alternative. They include errors in calculating the source term, the dispersion modeling, and the implied dose response relationship. These errors have been briefly discussed above and are explained in more detail in the attached statements of Drs. Hamilton, Chambers and Lowe, and Hersloff.

10-20 The draft also presumes to set radiological standards without any justification. For example, the draft does not indicate any basis for the overall radon limit of 3 pCi/l and the building interior limit of .03 WL. DEIS at 1-20. The limit of two times background level for gamma radiation has no rational foundation when applied as a blanket criterion over the entire minesite because natural background varies over an extremely broad range at and around the mine site. DEIS at 1-20.

10-21 The draft also fails to evaluate the radiological impact of the Laguna alternative. The Laguna plan originally envisioned placing protore below the groundwater recovery level, but was revised to place the protore above the groundwater recovery level. The draft contains no analysis of the radiological impacts of this approach. DEIS at 3-12.

2. Volumetric And Reclamation Cost Estimates

10-22 The volumetric analysis in the draft EIS erroneously concludes that there is virtually no difference in the amount of material to be moved under the Green Book, DOI, and Laguna alternatives and that the reclamation cost of those alternatives varies less than \$3.3 million. DEIS at 1-35. Morrison-Knudsen, based on far superior data and methods, has determined that nearly 27 million cubic yards more would be moved under the Laguna plan and 5-10 million cubic yards more would be moved under the DOI alternatives. The difference in reclamation cost would be about \$27 million between the Green Book and the Laguna plan, \$7 million between the Green Book and the DOI drainage alternative and \$3 million between the Green Book and the DOI monitor alternative. Thus, the Department has underestimated the incremental cost of the DOI monitor, DOI

drainage, and Laguna alternatives by 93%, 380%, and 827% respectively.

The methods used by BLM to make volumetric calculations and estimate reclamation costs are inadequate, fail to conform to commonly used and accepted industry practices, and are inferior to the methods used by Anaconda and its consultant Morrison-Knudsen.

When Anaconda first reviewed the draft EIS, we immediately noticed that there were substantial volumetric and cost errors with respect to the Green Book and that the small difference in reclamation costs between various alternatives was totally unrealistic. Anaconda initially hoped to identify the source of the errors and generate accurate volumetric and cost estimates for DOI and Laguna alternatives from DOI background documentation for its estimates. When this information was requested, the EIS team could produce little more than a largely undecipherable computer tape containing topographic data and crude cost and volume calculations. Anaconda spent nearly four months attempting to secure, decipher and correct the BLM topographic data. Kelsey statement at 1-3.

Although Anaconda was able to identify a lot of the errors in the topographic data, it could not be used to generate accurate volumetric and cost estimates for the various alternatives because of these errors and because BLM has never provided the post-reclamation topographic data requested. Kelsey statement at 3-4.

In order to secure accurate volumetric and cost estimates, Anaconda retained Morrison-Knudsen. Morrison-Knudsen based its volumetric estimates on surveyed topographic data, which is far superior to the computerized data drawn from aerial photography used by BLM. It then developed costs based on sophisticated studies of equipment needs, haulage routes, and scheduling. Boyd statement at 4-7. No such studies were performed by BLM. The methods and procedures used by BLM to analyze these critical components of reclamation cost estimates are inadequate and do not conform to generally accepted industry practices. Boyd statement at 6. As indicated above, the BLM methods resulted in wholly erroneous volumetric and reclamation cost estimates.

3. Highwall Stability

The draft EIS erroneously states that the Gavilan Mesa highwall will fail if buttressed according to the 1982 Green Book plan. DEIS at 1-14, 1-26, 3-1. The Seegmiller data and his recent analysis indicates that the wall is stable even if left unbuttressed. Seegmiller statement at 7. The safety factor exceeds 1.5, which means that there is approximately one chance in a thousand that the highwall will fail during the

next 100 years. Seegmiller statement at 7. If buttressed in accordance with the 1982 Green Book, the safety factor would increase to 1.6. The DOI proposal would further increase the safety factor by changing the highwall profile. However, as Seegmiller indicated, the wall is definitely stable and the buttress and profile change are neither necessary nor justified. Seegmiller statement at 7-8.

The change in the Gavilan Mesa profile proposed by DOI and the Laguna is infeasible. DEIS at 1-14, 3-7, 3-8. The modification would result in substantial danger to workers. Seegmiller statement at 11. It would also be extremely difficult and costly to accomplish because it would require small equipment working in very confined areas. Id.

10-24(Cont.) This profile change is not justified by the possibility of falling rock. Rock that topples from the highwall is likely to fall on the closest bench. Even if it reached the bottom of the highwall, that area is not occupied and is relatively inaccessible. Raveling of rock from the highwall is gradual process and is not a catastrophic event.

The draft misleads the reader into believing that the Laguna proposal may significantly reduce safety risks from the North and South Paguate highwalls. DEIS at 1-14, 3-7. The highwalls do not pose any significant hazard. They are definitely stable. The risk of injury from falling rock is extremely low. The risk of falling from the highwalls is not specified in the draft but is clearly extremely low: no one has fallen off any of the highwalls during the thirty years of mine operation. Furthermore, the highwalls are similar to natural cliffs in the area and they pose not more hazard than these natural conditions.

4. Waste Dump Stability

10-25 The draft EIS assumes that waste dump material cohesion will decrease to zero. DEIS at 3-9. The Seegmiller analysis demonstrates that this assumption is wrong. Seegmiller statement at 12-14. Thus, the conclusion in the draft that most of the waste dumps will fail if modified in accordance with the 1982 Green Book plan is incorrect. Id.

The draft is also inconsistent in its treatment of cohesion. It assumes no cohesion for our waste dump design, but assumes cohesion on the DOI buttress for the Gavilan Mesa highwall. Seegmiller statement at 11.

5. Erosion

The draft EIS estimates that, under the 1982 Green Book plan, 27 tons of radioactive U_3O_8 will enter streams due to surface sheet erosion. DEIS at 3-36. This is completely inaccurate. All protore will be put in closed basin pits. The remaining Jackpile Sandstone that could erode from waste dump slopes has very little mineralization and certainly less than the .02% U_3O_8 mentioned in the draft. DEIS at 3-37.

The draft exaggerates greatly the sediment yield to streams from erosion under the 1982 Green Book plan. DEIS at 3-36. Much of the eroded soil will not enter streams because the slopes drain to closed basins. DEIS at 3-36.

10-26 The draft substantially underestimates erosion problems under the DOI and Laguna plans. First, the draft inaccurately estimates the sediment yields caused by draining pit areas into the streams under the DOI drainage option. DEIS at 3-38. Second, the DOI drainage design concentrates runoff and the drainage channel could incize into protore materials placed in the pit, transporting radioactive material into the streams. DEIS at 3-38. The draft fails to assess this risk. Third, the DOI headcut armoring design is susceptible to undercutting and failure, which the draft fails to discuss. DEIS at ix, 3-34, 3-35.

Finally, the draft overstates the advantages of the longer flatter dump slopes proposed by DOI over the short, slightly steeper, dump slopes proposed in the 1982 Green Book. While Anaconda has adopted the DOI waste dump approach in the 1985 plan, it has done so primarily to avoid controversy on this point. The draft exaggerates the problems associated with the terracing proposed in the Green Book and is thus inaccurate.

6. Revegetation

10-27 The draft EIS erroneously assumes that an area achieving 70% success after 3 years of monitoring will not continue to improve. DEIS at 3-42. The 70% success criterion is a bond release criterion, not an estimate of ultimate revegetation success. Both Drs. Keammerer and Ludeke believe, based on their analysis of revegetation data collected on site, that the revegetated area will exceed 90% of the native reference areas within 5-10 years if the 70% success criterion is met within 3 years. Keammerer statement at 1-2; Ludeke statement at 3-5.

The CSA method of analysis proposed by the DOI alternatives is inappropriate for measuring revegetation success at the Jackpile Paguate mine. It measures changes in relative importance of species in vegetation that reached climax hundreds of years ago; under such circumstances, those changes may

indeed indicate vegetation problems. However, in a subclimax area or an area that has recently reached climax vegetation, changes in the relative importance of species are normal and do not reliably indicate vegetation problems. Keammerer statement at 4-6.

10-27(Cont.)

The vegetation parameters suggested by the DOI proposals are improper or duplicative. For example, foliar and basal cover are parallel analyses of plant development. DEIS at 1-20, 3-42. Inclusion of both as vegetative parameters or indicators of revegetation success is duplicative. Similarly, the vegetative parameters chosen (ix, 3-42) do not measure diversity, which the draft suggests is a criterion of revegetative success. A 90% comparability criterion does not assure any greater diversity than a 70% criterion.

7. Procedures

10-28

The format and procedures followed in preparing the draft EIS have limited its effectiveness as a decisionmaking tool and as a means to solicit intelligent public comment. The draft EIS failed to identify a preferred alternative, rendering it difficult for the public to focus comments. The draft EIS does not contain any cost/benefit analysis and does not even qualitatively analyze the incremental costs and benefits accruing from various features included in each alternative. While such analysis is not uniformly required, it would greatly facilitate a rational choice of alternatives in this matter.

VI. CONCLUSION

10-29

Anaconda requests that the draft EIS on the Jackpile Paguate Uranium Mine Reclamation Project be withdrawn, rewritten and republished in draft form for public comment. We believe that the current draft is inadequate as a matter of law. It is neither a reasonable tool for decisionmaking nor a sufficient basis for intelligent public comment on the alternatives. The draft fails to seriously consider the no-action alternative, does not consider an adequate range of alternatives, and contains a substantial number of crucial factual and analytic errors. These deficiencies alone necessitate publication of a new draft. In addition, a revised draft should be published to incorporate significant new information provided by Drs. Hamilton, Chambers and Lowe, and Hersloff regarding radiation, by Dr. Seegmiller regarding stability of the Gavilan Mesa highwall and by Morrison-Knudsen regarding volumetric and reclamation cost estimates. Finally, a revised draft should be prepared to analyze the environmental impacts of the 1985 Multiple Land Use Reclamation Plan submitted today.

10-29(Cont) The 1985 Multiple Land Use Reclamation Plan represents an innovative, state-of-the-art approach to reclamation of the Jackpile Paguate mine. It will provide multiple land uses including grazing, water resource development, fish and wildlife habitat, recreation, and future mine use. The plan deserves serious analysis and consideration by the Department of the Interior.

STATEMENT OF
DR. LEONARD D. HAMILTON

My name is Leonard D. Hamilton. I am currently, and have been since its inception, the Head of the Biomedical and Environmental Assessment Division in the National Center for the Analysis of Energy Systems at Brookhaven National Laboratory. The Biomedical and Environmental Assessment Division at Brookhaven National Laboratory is an interdisciplinary group that assesses the health and environmental impacts of all energy sources from exploration to end-use. I am considered to be an expert on the health effects of ionizing radiation. My professional qualifications and experience are summarized in Attachment A. The views expressed in this statement are my individual views and do not necessarily represent the official views of Brookhaven National Laboratory.

At the request of Anaconda Minerals Company, I reviewed the radiation impact analysis contained in the Draft Environmental Impact Statement (DEIS) for the Jackpile-Paguate Uranium Mine Reclamation Project and the 1983 background report prepared by Momeni, et al., entitled "Radiological Impact of Jackpile-Paguate Uranium Mines -- an Analysis of Alternatives of Decommissioning." Argonne National Laboratory, Argonne, Illinois, ANL/ES-131 ("the Momeni report").

The analysis of radiological health impacts summarized in the draft EIS is essentially based on detailed evaluations given in the 1983 Momeni report. The DEIS analysis is fatally flawed because the 1983 Momeni report contains serious

scientific errors. These errors are of such size that the section dealing with radiological health impacts in the DEIS must be rewritten to correct them. I am confident that once these errors are drawn to the attention of the Division of Environmental Research, Argonne National Laboratory, the 1983 Momeni report and the DEIS will be corrected.

10-303 The most egregious error in the DEIS and 1983 Momeni report is the gross overestimate of radiation-induced cancer mortality. The report predicts that, under the no-action alternative, there would be between 95 and 243 radiation-induced cancer deaths in the regional population over 90 years. This estimate immediately appeared unreasonable to me in light of the low levels of radiation reported at the mine site.^{1/}

Given the discrepancy between the low levels of radiation reported and the cancer mortality predicted, I focused my attention on the methods used by Dr. Momeni to estimate the health effects from a given amount of human exposure (i.e., the dose-response relationship) and to a lesser extent on how radiation release rates and human exposure (i.e., dose) were estimated. I found significant errors in both of these aspects of his methods.

^{1/} Furthermore, the Momeni report predicts that the leading causes of mortality would be leukemia and genito-urinary cancer. This is totally unrealistic because the primary exposure from the site is inhalation of radon and radioactive particulates. If that exposure were sufficient to cause cancer, it would primarily cause lung cancer and bone cancer, certainly not leukemia or genito-urinary cancer.

In summary, the dose-response calculations quoted in the DEIS are in error by at least a factor of 100, so that the health risk from the mine is grossly exaggerated. The DEIS does not explain or justify the radiation source estimates, the exposure calculations, or the dose-response relationships in the analysis.

ERRORS DETECTED IN THE IMPLIED DOSE-RESPONSE RELATIONSHIP
USED BY MOMENI

The most significant error arises from Momeni's attempt to translate dose estimates into estimated potential mortality as a result of radiation-induced cancer. To accomplish this task, Momeni used a computer code he developed, known as the "Potential Radiation-Induced Biological Effects in Man ("PRIM") code. The PRIM code purports to estimate potential mortality as a result of radiation-induced cancer on the basis of the total radiation doses from exposures to mine emissions using the dose-response relationships recommended by the National Academy of Sciences in BEIR III (NAS 1980) for both the absolute risk and the relative risk models. (1983 Momeni report at 4-7.) However, I have examined the dose-response relationships implied in Momeni's work and have found that they are wholly inconsistent with those in BEIR III.

10-31 | The overall dose-response relationships implied in DEIS and in the 1983 Momeni report are about two orders of magnitude higher than those of BEIR III report (NAS, 1980). The origins of these errors are actually difficult to discern from the

10-31(Cont.)

information provided by the 1983 Momeni report, the computations given therein, and references to PRIM cited in the report.^{2/} But, perhaps the easiest way to determine the implied dose-response relationship used by Momeni in PRIM is to compare the annual effective collective dose equivalent [70y] commitment 200 person-rem/y (derived from DEIS at 3.23 and the 1983 Momeni report at 3-4) with the annual excess deaths.^{3/}

2/ Momeni, M.H. 1983b cited in the 1983 Momeni report (1983) (p. 4-16) was available for review. Momeni, M.H. 1983a "Potential Radiation - Induced Radiological Effects in Man -- Version 3," Argonne National Laboratory, cited in the 1983 Momeni report (p. 4-16) as in preparation has apparently never been completed and was unavailable for review. In addition I received two other papers by Momeni on this subject: Momeni, M.H., Dungey, C.E., and Roberts C.J. "Analysis of Atmospheric Pathways of Exposure at Jackpile Mine" presented to the Canadian Nuclear Society International Conference on Radioactive Waste Management, Winnipeg, Manitoba, Canada, September 12-15, 1982, ISBN D-919784-01-01 and Momeni, M.H. "Analysis of Potential Radiation-Induced Genetic and Somatic Effects to Man from Milling of Uranium" presented to International Radiation Protection Association, 6th International Congress, Berlin, May 2-12, 1984. None of these papers provide the information necessary to pinpoint the exact source of the errors in PRIM or in the 1983 Momeni report; none discuss or explain the errors and anomalies identified in this statement.

3/ During the 5-year period about the 85th year, total population is changing by only 0.2% per year (487.7k - 483.6k / 483.6k / 5 y period) from Table 4.9, p. 4-15 in the 1983 Momeni report. This is not very much. 85 years is time enough for some sort of steady-state to have been established; certainly the error in assuming so is not two orders of magnitude. Therefore, we expect the excess mortality rate in the 85th year to be related simply to the annual effective dose equivalent commitment.

The number of radiation-induced cancer deaths in the 5-year period labelled "85" is given (table 4.9) as 11.9 (absolute model) and 36.5 (relative model). On an annual basis this is equivalent to 2.38 (absolute) and 7.3 (relative) radiation-induced cancer deaths.

The implied dose response is:

Absolute Risk model -- $2.38 \text{ deaths/y} \div 200 \text{ rem/y} = 1.2 \text{ E-02 cancer deaths/rem} = 12,000 \text{ deaths/million person-rem.}$

Relative Risk Model -- $7.3 \text{ deaths/y} \div 200 \text{ rem/y} = 3.7 \text{ E-02 cancer deaths/rem} = 37,000 \text{ deaths/million person-rem.}$

10-31(Cont.)

These values are about 100 times what they should be if one is using a linear no-threshold model. For example, BEIR III contains values of 158 per million person-rem for the absolute risk model and 403 per million person-rem for the relative risk model. (Table V-4, p. 147, NAS 1980.)

Confirmation of this overestimate by the PRIM code of the BEIR III dose-response relationships can be found by examining in detail two types of cancer, specifically the DEIS's absolute risk model prediction for leukemia and relative risk model prediction for lung cancer. The implied leukemia dose-response coefficient is 0.102 leukemia deaths per rem (1.66/16.2), three orders of magnitude too high.^{4/} The implied dose-response coefficient is 0.065 lung cancer deaths per rem effective dose, more than two orders of magnitude too high.^{5/}

^{4/} The dose commitment to red marrow under the No Action Alternative given in the DEIS (at 3.23) is 16.2 person-rem/year. The 1983 Momeni report at 4-12 gives 8.3 leukemia deaths in the 5-year period about the 85th year, or 1.66 deaths per year.

^{5/} Calculations using various kinds of lung dose are less straightforward. Exposure of the bronchial epithelium to radon daughters is generally expressed in terms of working-level months (WLM) and risk coefficients are generally expressed in WLM. These exposures and risks are not easily converted to

After my review was completed, I became aware of an evaluation of the PRIM code made independently in April 1983 by Dr. M. Ginevan and Dr. J. Puskin, Health Effects Branch, Division of Health, Siting and Waste Management, U.S. Nuclear Regulatory Commission, using a different method but coming essentially to the same conclusion [see Appendix B for copy of this analysis]. From Table 3.13 the 1983 Momeni report, they roughly inferred that the total population dose is about 400 person rem/year, or about 1 mrem/person/year. BEIR III shows that 1 rem/year results in 4,757 excess fatal cancer (all forms of cancer) per million persons using the absolute projection model and 11,970 using the relative risk projection model. (NAS 1980, Table V-22, p. 209.) Thus, if the PRIM model functioned correctly, it should yield roughly 2.5 radiation-induced

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units of rem for combination with effects due to dose to the pulmonary lung and whole body. (I have conservatively assumed that "whole body" dose refers to uniform gamma irradiation of all organs which adds to other specific organ doses. Limited discussion of the validity of these doses as estimated by the UDAD code is given below in the section "PROBLEMS WITH MOMENI'S USE OF THE UDAD CODE.") However, in keeping with the spirit of doing an order-of-magnitude check, one can simply use the bronchial epithelium weight of 0.06 used in ICRP-32 (1981).

The committed doses to the bronchial epithelium, pulmonary lung, and whole body are 122.0, 30.8, and 94.3 person-rem/year respectively as given in the Momeni report. (Momeni, et al. 1983 at 3-44). Weighting these doses by 0.06, 0.12, and 0.12 yields 7.3, 3.7, and 11.3 respectively, or a total of 22.3 person-rem/year effective dose equivalent. The relative risk model, 5-year period lung cancer deaths about the 85th year is 7.2 (the 1983 Momeni report at 4-13), or 1.44 lung cancer deaths/year.

cancer deaths using the absolute risk model and 6 using the relative risk model, instead of the values of .6 and 243.2 cancer deaths reported in the 1983 Momeni report (Tables 4.7 and 4.8), and the 95 and 243 cancer deaths reported in the DEIS. (DEIS at 3-25.) The total population dose inferred by Ginevan and Puskin presented an unweighted total of the organ-rem/yr. If these figures had been weighted, as I have done in this analysis, their numbers would be even closer to my estimate.

PROBLEMS WITH MOMENI'S USE OF THE UDAD CODE

10-32 Momeni used another computer code he devised to calculate exposure rates and doses. This code is known as the "Uranium Dosimetry and Dispersion" (UDAD) code (Momeni, et al. NUREG/CR-0553, ANL/ES-72 1979). The UDAD code has been heavily criticized as significantly and irreparably deficient. It was promptly replaced by the Nuclear Regulatory Commission with another computer program known as MILDOS. ("MILDOS - a computer program for calculating environmental radiation doses from Uranium Recovery Operations," NUREG/CR-2011 PNL-3767 1981.)

10-33 In my opinion, the UDAD code was never properly validated. In a comparison of theoretical predictions and measured radon daughter concentrations as a step towards validation of the UDAD code, Momeni and Zielen (1982) claimed that Gaussian dispersion methodology incorporated in the UDAD code can reasonably predict long-term averages of both radon concentration

10-33(Cont.) and working level. The paper itself does not support this conclusion. If background levels had been measured closer to the site for the full year, and subtracted from the three station measurements, the concentration and working levels for two of the three stations would look like white noise (i.e., consistent with no excess radon) though one station might still be statistically significant. A more important point is that monthly source strengths are free variables. What this means is that the source term is not measured and then the predicted value of concentrations checked against measurements; rather the source terms are adjusted for the best match of predicted and actual concentrations. The authors actually state [Momeni and Zielen 1982, p. 294]:

"The best value for Q [the source term] is that which minimizes the difference between the predicted and measured concentrations."

When this is done, the code is being calibrated and adjusted to a particular site, not validated.

10-34 Furthermore, in reviewing the doses to individual organs predicted by the UDAD code, I noted several errors. First, it is difficult to understand how, considering their anatomical proximity, there can be an external ground and cloud radiation dose to the small intestine, but apparently none to the stomach, upper or lower large intestine. Similarly, the total dose commitments from these exposures are estimated to be approximately 100 times greater to the small intestine than to the stomach, upper or lower large intestine. (1983 Momeni report at 3-45, 3-46.)

10-35 Other biological anomalies include the fact that, in the respiratory tract, the highest dose is reportedly received by the nasopharynx (1983 Momeni report at 3-41, 3-42), even though doses in this region are thought to be negligible as most of the cells are beyond the range of alpha particles. It would appear that the dose to the nasopharynx in the UDAD code includes a function similar to that used for its ingestion of radionuclides. The 1983 Momeni report (Table 3.10, at 3-41) which gives the dose from radon to the bronchial epithelium in over mrem/yr and in Working Level Months (WLM) the ratio of mrem/yr to WLM is not a constant, but varies considerably. This indicates that the code is not correct because the relationship between mrem/yr and WLM should be constant for a given individual or group.

10-36 It must also be noted that the dispersion part of the UDAD code significantly overestimates exposure of individuals. The magnitude of the overestimate can be demonstrated by comparing the results of UDAD predictions of radon emissions to actual measurements of radon emissions from the Anaconda Bluewater uranium mill. Momeni and Zielen (1982) calculated a source term for the Anaconda uranium mill of $194 \text{ pCi/m}^2\text{s}$ from the main section of tailings based on the UDAD dispersion model and measured concentrations at monitoring stations. (Table 4). However, information collected by EPA indicates that the actual source term is 310 pCi/m^3 .^{6/} Therefore, UDAD predicts a given

^{6/} The EPA Draft Environmental Impact Statement for Standards for the Control of Byproduct Materials from Uranium Core Pro-

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concentration at a monitoring station from an estimated source term much smaller than the actual source term, which means that the UDAD is overestimating dispersion by a factor of 1.6 (310/194).

ANALYSIS OF ACTUAL RADIOLOGICAL HEALTH RISK

Before presenting the results of our estimates of the health risks for the regional population and for the most exposed individuals, I will make several observations on the conservatism of dose-response relationships I have used to calculate the actual radiological health risk associated with the mine site, if left totally unreclaimed. My analysis of actual radiological health risk also uses the radiation sources, exposures and doses presented in the DEIS and the 1983 Momeni report despite reservations about their accuracy.

Both the low radiation doses and dose rates from natural background radiation, and the even lower doses and dose rates due to release of radon from sites of former uranium mining activities such as the Jackpile-Paguate uranium mine, are much lower than those for which there are data on adverse health effects. However, there is a general agreement that an upper boundary of risk can be estimated by assuming that population

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cessing shows a radium concentration of 620 pCi/g for this milling site. EPA 520/1-82-022 DEIS at pp. 3-6). Assuming emissions₂ of 0.5 pCi/m²s per pCi/g yields radon emissions of 310 pCi/m²s.

dose and tumor incidences observed at higher doses and dose rates can be extrapolated down to low doses and dose rates. This is commonly referred to as the "linear no-threshold (LNT) hypothesis". It assumes that there is no threshold below which exposure to radiation produces no possibility of adverse health effect; further it assumes that probability of an adverse effect is directly proportional to dose. The LNT hypothesis is known to be incorrect for several health effects for which experimental evidence has demonstrated that indeed there is a dose below which the effect does not occur. Among these are cataracts, impaired fertility, and abnormal fetal development (BEIR III NAS 1980 pp. 477-514).

For many other health effects (e.g., genetic defects and cancers), a threshold dose has yet to be demonstrated. This is not to say that a threshold does not exist. To the contrary, thresholds are likely because of the cellular repair mechanisms that tend to oppose radiation effects. Repair mechanisms are effective even against high linear energy transfer ("LET") radiation (such as the alpha particles emitted by radon-222 and some of its daughters), although the magnitude of the reduction of carcinogenic effects is often found to be smaller than with low-LET radiation (UNSCEAR, 1977). In the region of low cumulative dose at low dose rates for which cell-killing is not a factor, the assumption of a linear (e.g., one-hit), non-threshold (e.g., no-repair) risk model provides the most conservative, that is protective, approach to setting

standards. There are no known biological mechanisms which would produce "supra-linearity" (i.e., low doses or low dose rates would be more effective in inducing cancer on a unit dose basis than high doses or high dose rates) nor is there any credible epidemiological evidence to indicate their existence. Analysis of all uranium miner epidemiological data in the cumulative exposure region 0 to 100 WLM yields a risk coefficient no greater and possibly less than the value derived using the full data set. When very high dose rates are involved, due to a cell-killing effect which removes potential cancer cells, care must be taken when applying the model. BEIR III [NAS 1980, p. 140] may be referring to this pitfall in data analysis when they state the linear, no-threshold model may underestimate risk for high-LET radiation. The linear hypothesis is thus still conservative for high-LET radiation associated with radon.

The upper boundary risk estimate for the regional population over a 90-year period (using the linear no-threshold assumption for the dose-response relationship and the radiation sources, exposures and doses given in the DEIS and 1983 Momeni report) gives a total excess cancer mortality of 3. Adjusting this figure for the average 70-year life expectancy in the region gives an individual lifetime risk of radiation-induced cancer of 6.5×10^{-6} . This is an extremely small, indeed a miniscule risk. In reality, bear in mind that the upper boundary estimate of 3 additional cancer deaths over 90 years is

just that, a statistical estimate based on summing this tiny risk to hundreds of thousands of people over 90 years. The odds are more than 100,000 to 1 that during these 90 years each individual will die of some cause other than that of cancer induced by residual radiation from the mine-site. Since the commonest things occur most often, this is in fact what will happen.

According to preliminary review by SENES Consultants Ltd., Willowdale, Ontario, Canada, August 1985, the Anaconda Minerals Company 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Mine would reduce the particle and radon source term to approximately 15% and 60% of the no-action values. From an analysis made on the effect of such a reduction on the estimate of individual excess cancer mortality rate per year and lifetime for the most exposed individuals around the site at Paguate [see below], one might reasonably estimate that such reductions might lower the lifetime risk by roughly a factor of 3. This would result in a risk to the entire regional population over a 90-year period of approximately one radiation-induced cancer death.

10-37 | Moreover, if this tiny risk to the regional population were adjusted to take into account the overestimation of the source terms -- radon and airborne particle releases -- in the Momeni 1983 report that was reported by Hersloff (1985) and for the overestimates I have mentioned in the UDAD code, this would reduce the risk still further. So that in reality, the

radiological health risk from the mine would become a small fraction of the risk that one ordinarily encounters from variations of natural background radiation when one travels as little as 5-10 miles.

COMPARISONS OF INDIVIDUAL HEALTH RISKS WITH OTHER RISKS
ENCOUNTERED IN EVERY DAY LIFE

The upper boundary individual lifetime risk of cancer for an individual in the regional population from radiation exposure under No Action Alternative conditions (6.5×10^{-6}) is about 1.5% of the risk from cosmic rays of living in Denver, Colorado compared to New York or 1.5% of the risk from radiation of living in a masonry rather than a wood building. In other words, both the latter are approximately 70 times riskier than living within 50 miles of the Jackpile-Paguate mine. An alternative perspective is given by considering the time necessary to accumulate a one in a million risk of death from the indicated cause living in the United States:

Motor vehicle accident	1.5 days
Falls	6 days
Drowning	10 days
Fires	13 days
Firearms	36 days
Living in Denver (due to cancer from cosmic rays)	2 months
Electrocution	2 months
Tornados	20 months
Floods	20 months
Lightening	2 years
Animal Bite or Sting	4 years
Living within 50 miles of Jackpile-Paguate mine under No Action Alternative	11 years
after 1985 Reclamation Plan completed	33 years

HEALTH RISK FOR MOST EXPOSED INDIVIDUALS

10-39 From the Momeni 1983 report it appears that Paguate is the location near the Jackpile-Paguate site with the highest dose and therefore where individuals would be at the maximum risk. It was not possible to discern from the DEIS nor Momeni 1983 what portion of the 70-year individual dose commitments from inhalation and ingestion would be from high-LET (a-particles) as opposed to low-LET radiation. Probably a large proportion of the estimated dose would be due to a high-LET radiation. However, to be conservative in the health risk estimates, I have assumed that all the inhalation and ingestion dose is due to high-LET radiation and made no correction for the fact that part would be low-LET radiation. Since the external radiation -- ground and airborne -- is low-LET gamma radiation, and since this is given at low doses and low dose rates, I have applied a dose-rate reduction effectiveness factor of 2.5 for reduction of the carcinogenic effectiveness of external low-LET radiation from the Jackpile-Paguate site. This reduction factor for low-LET radiation is based on 1977 UNSCEAR, BEIR III, P. 147 and NCRP Report No. 64 (1980). From these reports it is clear that the actual risks at these low doses and low dose rates could in reality be zero, so that one can still describe the lifetime risk of excess cancer to the most exposed individual at Paguate of 1.13 in 10,000 as representing a reasonably conservative upper limit of risk. See Attachment C.

The individual lifetime risk of cancer in the most exposed individuals at Paguate under No Action Alternative conditions of 1.13×10^{-4} is roughly the same as the lifetime risk of dying by:

- electrocution
- falling off a building
- being hit by a falling object
- accidental drowning
- living in Denver for lifetime
(due to cancer from cosmic rays)

Analysis of the effect of the reduction of the particle and radon source terms to 15% and 60% of the No Action Values as a result of the implementation of the Anaconda Minerals Company 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate mine indicates that the result that the lifetime risk would be reduced from 1.13×10^{-4} to 3.85×10^{-5} . This conclusion does not take into account overestimation of the source terms and overestimates in the UDAD code.

In summary, the 1983 Momeni and the draft EIS drastically overstate the radiological health risk associated with the No Action Alternative for the regional population. The actual risk is miniscule and would be vanishingly minute after the implementation of 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate mine. Even the estimated risk to the maximum exposed individuals at Paguate is small and would become even smaller after the proposed reclamation.

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DR. L. D. HAMILTON

PERSONAL QUALIFICATIONS

My name is Leonard D. Hamilton. My address is: 6 Childs Lane, Setauket, New York, 11733. I am, among other responsibilities, Head of the Biomedical and Environmental Assessment Division in the National Center for Analysis of Energy Systems at Brookhaven National Laboratory, Associated Universities, Inc., Upton, New York, 11973. The Biomedical and Environmental Assessment Division is jointly sponsored by the Department of Energy and Environment and Medical Department at Brookhaven. The Biomedical and Environmental Assessment Division (BEAD) aims at developing a realistic assessment of biomedical and environmental effects of energy production and use. All forms of energy, including electric power generation using fossil fuels, hydro, nuclear, and new technologies, are assessed. The Biomedical Environmental Assessment Division was the lead group in the Health and Environmental Risk Analysis Program, Human Health and Assessment Division, Office of Health and Environmental Research, Office of Energy Research, U. S. Department of Energy, assessing the health and environmental effects of energy production and use and among other responsibilities was charged with producing a comparative health and environmental effects assessment of the different energy systems. The Biomedical and Environmental Assessment Division also has substantial support from the U.S. Environmental Protection Agency and was the lead group for assessing the health effects of complex technologies. The Division is designated a World Health Organization and United Nations Environment Programme [WHO & UNEP] Collaborating Centre for the Assessment of Health and Environmental Effects of Energy Systems.

I have been involved in assessing the risks of radiation for man for 27 years, specifically the health effects of nuclear energy for electric power generation for 22 years, and the assessment of the comparative health effects from various energy sources, for the past 10 years. The Biomedical and Environmental Assessment activity formally began in July, 1973; for the past and present year our level of effort is 204 man-months annually.

I received my Bachelor of Arts in 1943 and qualified in medicine from Oxford University in 1945. I am a registered medical practitioner in the United Kingdom and licensed physician in New York State. After several positions in University hospitals, which included a position as Resident Medical Officer at the Radiotherapeutic Centre, Addenbrooke's Hospital, Cambridge, during which time I was concerned with the management of cancer patients undergoing treatment with radiation, I proceeded to research at Cambridge University on histological studies of the mechanism of the action of therapeutic doses of ionizing radiation for which I received my Ph.D. in experimental pathology in 1952. In the meanwhile, in 1951, I had received my Doctor of Medicine degree from Oxford; this is a senior medical qualification in the United Kingdom, roughly equivalent to Diplomate in Internal Medicine in the United States. I am also a Diplomate of the American Board of Pathology (Hematology).

From 1950-1964 I spent 14 years on the research staff of the Sloan-Kettering Institute for Cancer Research and on the clinical staff of Memorial Hospital in New York being Associate Member and Head, Isotope Studies Section at the Institute and Assistant Attending Physician,

Department of Medicine at Memorial. During this time I was also a member of the faculty of Cornell University Medical College and a Visiting Physician, Cornell Division, Bellevue Hospital. Since then I have maintained a continuing association with the Sloan-Kettering Institute as Associate Scientist.

At the Institute my laboratory research was on the molecular structure of the genetic material (DNA) and the cells in man concerned with the immune mechanism. I provided the DNA on which the proof of the double-helical structure of DNA is based, and was one of the first to establish the long life of the immune cells in man. My clinical work in Memorial Hospital involved research on the treatment of patients afflicted with cancer and leukemia with new chemical agents and also with new applications of radiation therapy.

In 1964 I joined the scientific staff of Brookhaven National Laboratory as Senior Scientist and Head, Division of Microbiology, and Attending Physician, Hospital of the Medical Research Center. Since 1973 I have been Head of the Biomedical and Environmental Assessment Group which in 1976 became a Division of the National Center of Analysis of Energy Systems.

At Brookhaven I continued my laboratory research begun at Sloan-Kettering. In addition since my Visiting Fellowship at St. Catherine's College, Oxford 1972-73, I have been concerned with placing all risks in life in perspective; and since becoming Head of the Biomedical and Environmental Assessment activity in 1973, particularly with the assessment of the hazards associated with different energy sources and their use. Our group has the lead responsibility to DOE for

the assessment of health and environmental effects from various energy systems, and of coordinating such assessments in national laboratories, universities and research institutes in the United States.

My interest in the risks of radiation for man began with my Ph.D. work in Cambridge in 1946 and, since DNA and the immune system are prime targets of radiation damage has continued throughout my laboratory research. I was associated informally with the United Nations Scientific Committee on Effects of Atomic Radiation (UNSCEAR) almost since its inception in 1957, served as Consultant, Office of the Under-Secretaries for Special Political Affairs (UNSCEAR), 1960-62, and was responsible for the first draft of the somatic effects of radiation in the 1962 report. This section covers the effects of radiation in inducing leukemia and cancer in man. I have reviewed most of the working papers of UNSCEAR since then. I was a member of the National Research Council-National Academy of Sciences (^{NRC}NAS-NAS) Committee on Biological Effects of Atomic Radiation, Subcommittee on Hematologic Effects, 1960-64, the NRC-NAS Solar Energy Research Institute Workshop, 1975, the NRC-NAS Committee on Environmental Decision Making, Steering Committee on Environmental Monitoring, Panel on Effects Monitoring 1975-76, the NRC-NAS Health Effects Resource Group, Risk Impact Panel of the Committee on Nuclear and Alternative Energy Systems (CONAES) 1975-80, the NRC-NAS Panel on the Trace Element Geochemistry of Coal Resource Development Related to Health 1976-80, and the NAS-NRC Committee on Research Needs on the Health Effects of Fossil Fuel Combustion Products, 1976-80.

I was a member of the Mayor's Technical Advisory Committee on Radiation, New York City, since 1963 until its end, December, 1977 and

have been a member of the Technical Advisory Committee on Radiation to the Commissioner of Health of the City of New York since August, 1978.

Since 1972, I was a Consultant to the Environment Directorate, Organization for Economic Co-operation and Development; since 1976 served as DOE (formerly ERDA) Representative in the U. S. Delegation to the Environment Committee and U. S. delegate to the Joint Environment-Energy Steering Group. I was a member of the United Nations Environment Programme (UNEP) International Panels of Experts on the Environmental Impacts of Production, Transportation, and Use of Fossil Fuel 1978, on the Environmental Impacts of Nuclear Energy 1978-79, on Renewable Sources of Energy and the Environment 1980, and on the Comparative Assessment of Environmental Impacts of Different Sources of Energy, 1980. I was a member of the Beijer Institute, Royal Swedish Academy of Sciences, UNEP, and USSR Commission for UNEP International Workshops on Environmental Implications and Strategies for Expanded Coal Utilization, 1980, 1984.

I am currently a member of the U. S. Department of Health and Human Services, Public Health Service Centers for Disease Control, National Institute for Occupational Safety & Health group of consultants advising on the epidemiological study of the employees at the Portsmouth Naval Shipyard where an alleged increase in leukemia was reported by Najarian and Colton in 1978, a Consultant to the United Nations Environment Programme on the comparative health effects of different energy sources, World Health Organization (WHO) Focal Point in the United Nations on Health and Environmental Effects of Energy Systems, and a Member of the WHO Expert Advisory Panel on Environmental Hazards.

I have been Professor of Medicine, Department of Medicine, Health Sciences Center, State University of New York at Stony Brook, New York

since 1968 and I am currently a member of the American Association for Cancer Research, American Society for Clinical Investigation (emeritus), American Association of Pathologists, Inc., the Harvey Society, and the British Medical Association.

I have published more than 150 scientific papers, including many reports assessing the hazards of various energy sources.

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ATTACHMENT B

April 25, 1983

(RETYPE FOR PRINTING)

Dr. Michael N. Momeni
Division of Environmental Studies
Argonne National Laboratories
Argonne, Illinois 60439

Dear Dr. Momeni:

At the request of Dr. William Mills we have reviewed the outputs of your PRIM code as contained in the paper that you gave last January in Albuquerque, and the radiological impacts assessment of the Jackpile Paguate uranium mines (ANL/ES 131). While dynamic demographic models may have merit for radiological impacts assessment, it is our belief that the PRIM code contains serious flaws and is not useable in its present form.

First, there appears to be a large discrepancy between BEIR III and the outputs of PRIM in terms of the magnitude of the impacts. From Table 3.13 of ANL/ES 131 we infer that the total population dose is about 400 person rem/year, or about 1 mrm/person/year. From table V-22 of the BEIR report we find that lifetime exposure to 1 rem/year results in 4751 excess fatal cancers per million in the absolute risk case and 11970 in the relative risk case. Thus your model should yield roughly 2.5 premature deaths for the absolute risk model and 6 premature deaths for the relative risk model, as compared to your values of 94.6 and 243.2 deaths, respectively (ANL/ES 131 Tables 4.7 and 4.8).

There are numerous other anomalies in your results. For example, leukemia made up 72% of the total deaths in the absolute risk model but only 2% in the relative risk formulation. Similarly, cancers of the urinary and sex organs make up less than 1% of total cancers in the absolute risk model but over 56% of total cancers under the relative risk model. Such discrepancies cannot be explained as differences between absolute and relative risk models of the BEIR report, and are also in conflict with what is known about radiation carcinogens.

A further observation concerns the results of the leukemia model. Most excess leukemia in the atom bomb survivors has already occurred. Based on these nearly complete data it is clear that a relative risk model does not fit leukemia incidence. For this reason, only an absolute risk model for leukemia was included in BEIR III (see table V 16 and accompanying text in the BEIR III report). Therefore, if one uses BEIR III one should have only one value for excess leukemia deaths. You present two which differ by a factor of ten. Finally, we also find it strange that in Table 3.13 only the stomach, among the digestive organs, receives any external dose, and that the dose to the stomach is 100 times greater than to either the large or small intestine.

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Dr. Michale N. Momeni

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We think you should carefully review your code before attempting to write documentation for it or using it in other assessments. If, after considering our comments, you feel that we are correct, you might also wish to inform the people at the Department of the Interior that the health effects section of your report is in error. Alternatively, if you feel that we are mistaken in our evaluation we would be happy to discuss any differences in fact or opinion which have contributed to our divergent views. In either case we hope that you find our comments helpful and constructive.

Sincerely,

Michael Ginevan
Health Effects Branch
Division of Health, Siting,
and Waste Management

Jerome Puskin
Health Effects Branch
Division of Health, Siting,
and Waste Management

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CHRON
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H. RF
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MILES

Estimate of individual excess cancer mortality rate per year at Paguate
[ANL/ES-131, pp.3-41 to 3-43]

	Whole Lung	Pulmonary Lung	Naso- pharynx	Bronchial Epithelium	Red Marrow	Ovary	Bone	Kidney	Liver	Whole Body	Sum
Inhalation		5.24	29.40	28.00			6.66	1.84			
Ingestion							10.40	6.68	1.99	1.12	
Airborne external	0.11				0.13	0.09				0.12	
Ground external	6.68				7.60	5.23				7.12	
<hr/>											
N=0.4 for external exposure. Based on BEIR III, p. 147.											
Airborne external	0.04				0.05	0.03				0.05	
Ground external	2.67				3.04	2.09				2.85	
<hr/>											
Sum	2.72	5.24	29.40	28.00	3.09	2.13	17.06	8.52	1.99	4.02	
Weight (ICRP 26)	0.12	0.06	0.06	0.06	0.12	0.06	0.06	0.06	0.06	1.00	
Effective dose	0.33	0.31	1.76	1.68	0.37	0.13	1.02	0.51	0.12	4.02	10.25

effective dose equivalent commitment = 10.25 mrem/y
dose-response = 0.000158 /rem (BEIR III Table V-25)
(linear, absolute model)

1.62E-06 risk/year
lifetime = 70 years

1.13E-04 lifetime risk

- NOTES: (a) Radiation induced cancer has not been observed for the testes [NIH 1985: 262]; however, for the ovaries, risk is uncertain and has been assigned a weight of 0.06 here.
- (b) Neither ICRP 26 nor ICRP 32 consider the nasopharyngeal region explicitly. Since risk to larynx and nasal sinuses is uncertain

STATEMENT CONCERNING THE
JACKPILE-PAGUATE
URANIUM MINE RECLAMATION PROJECT

Prepared for
ANACONDA MINERALS COMPANY

by

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August 14, 1985

SUMMARY

In June of 1985, SENES Consultants Limited were retained by Anaconda Mineral Company to review the radiological impact analysis of the Jackpile-Paguate reclamation project as described in the draft Environmental Impact Statement, dated February 1985, prepared by the U.S. Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs, (DOI, 1985) and as described in a report entitled "Radiological Impacts of Jackpile-Paguate Uranium Mines, An Analyses of Alternative of Decommissioning" prepared by M. H. Momeni et al (1983).

The principal observations arising from our review are:

- 1) the documentation of the analyses presented in the Momeni report is incomplete and the Momeni report appears to be internally inconsistent;
- 2) the estimates of risk reported by Momeni are too high by about a factor of 100;
- 3) the multiple land use plan recently developed by Anaconda would reduce the dust and radon source terms to about 12% and 60% of the no action option. This would correspondingly reduce the predicted doses due to radionuclides in dust and radon.

1.0 INTRODUCTION

SENES Consultants Limited are a group of scientists and engineers who specialize in the area of energy, nuclear and environmental sciences.

SENES staff have extensive experience in environmental and health aspects of uranium mining and have carried out or supervised more than fifty studies in the areas of dose assessment, worker radiation protection, dose reconstruction for epidemiological analyses, ALARA optimization analysis, radioactive waste management, and evaluation of scientific data related to uranium miner regulations.

In June of 1985, SENES Consultants Limited were retained by the Anaconda Mineral Company to review the radiological impact analysis of the Jackpile-Paguate reclamation project as described in the draft Environmental Impact Statement (DEIS), dated February 1985, prepared by the U.S. Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs, (U.S. DOI, 1985) and as described in a report entitled "Radiological Impacts of Jackpile-Paguate Uranium Mines -An Analysis of Alternatives of Decommissioning" prepared by M. H. Momeni et al (1983).

The review presented in this statement was prepared by Dr. Douglas B. Chambers and Dr. Leo M. Lowe. Dr. Chambers holds a Ph.D. in Physics from McMaster University and has more than ten years of experience in the environmental and health aspects of uranium mining. Dr. Lowe earned a Ph.D. in Physics from McMaster University and has eight years experience in analysing the environmental and health aspects of radiation. The qualifications of Drs. Chambers and Lowe are detailed in Attachment A. Ms. V. J. Cassaday, also with eight years experience, ran the computer model for the pathways analysis.

2.0 SOME CONSIDERATIONS OF RISK FROM EXPOSURE TO IONIZING RADIATION

How large is the risk of exposure to low levels of radiation? The International Commission on Radiological Protection (ICRP) concludes that the mortality risk factor for whole body radiation is about 1 in 10,000 per rem (ICRP 26 1977). This means that if a person is exposed to 1 rem of radiation (above natural background), his chances of dying from cancer are increased by about 1 in 10,000. An individual would normally be exposed to about 7 rems of radiation over his lifetime from natural sources of radiation (excluding radon). This may vary by a factor in the range of 2-5 depending upon where one lives, and one's lifestyle and occupation.

Exposure to radon daughters is measured in working level months (WLM)¹. The National Council on Radiation Protection and

1. The calculation of radon and radon daughter concentrations and the dosimetry of radon and radon daughters is complex. Radon daughters are more hazardous than radon (it is inert and does not react with the body when inhaled) and exposure to radon daughters is most commonly expressed in working level months (WLM) rather than rads or rems. This is because risk estimates for exposure to radon daughters have been basically derived from epidemiological studies on uranium miners from which the WLM unit was derived. One WLM results from continuous exposure to one working level (WL) of radon daughter for 170 hours (working month). One WL is a measure of concentration of radon daughters and is defined as any combination of short-lived radon daughters in one liter of air that will produce 1.3×10^5 MeV of alpha energy. Expressed in perhaps more familiar units, the concentration of radon daughters in equilibrium with 100 pCi/L of radon is 1 WL. Equilibrium is not practically achieved except in closed spaces. A typical annual average equilibrium fraction in houses is about 0.5 so that typically 100 pCi/L of radon would result in a concentration of 0.5 WL of radon daughters.

Measurements (NCRP) estimates a lifetime risk of between 1 to 2 cases per 10,000 persons exposed to 1 working level month (i.e. $(1-2) \times 10^{-4}$ per WLM) (NCRP 78 1984). Evans et al (1981) examined the risk from environmental exposure to radon and its daughters and estimated an upper limit of about 1×10^{-4} per WLM for members of the general public. The typical lifetime exposure to radon daughters is about 15 WLM (NCRP 78 1984).

In our analysis, we assume a lifetime risk of about 1×10^{-4} per WLM for a member of the public. On this basis, the lifetime risk of mortality from cancer from 1 rem (1000 mrem) of whole body radiation is comparable to the lifetime risk of mortality from lung cancer from 1 WLM of radon daughter exposure.

Although we are not aware of any radiation standard directly applicable to the Jackpile-Paguate decommissioning, reference can be made to currently recommended levels of exposure for individual members of the public. Both the National Council of Radiation Protection and Measurements (NCRP) and the International Commission on Radiological Protection (ICRP) currently recommend a limit of 500 mrem per year, excluding both medical radiation and natural background, for individuals in the population when exposure is not continuous. For continuous radiation exposure the limit recommended by both groups for an individual member of the public is 100 mrem per year.

3.0 EXPOSURE AND DOSE ESTIMATES

The potential radiological impacts of the reclamation alternatives for the Jackpile-Paguate uranium mine, summarized in the DEIS, are described in more detail in the report prepared by Momeni et al (1983). This section presents our review of the Momeni report. Table and page numbers given below refer that report, unless stated otherwise.

3.1 General Discussion

The Momeni report calculates potential radiation exposure and doses to various members of the population for each decommissioning alternative and then converts these doses into potential numbers of health effects. The presentation of the exposures and doses was sufficiently difficult to follow² that we found it necessary to set up a simplified pathways analysis to help us understand the report.

The exposure and dose calculations in the Momeni report appear to lead to errors in the estimates of dose for certain pathways in excess of two orders of magnitude. Because the calculations do not contain a uniform amount of error, a complete reanalysis of exposure and dose would be necessary to determine the total result of these errors. Such a reanalysis would be a major analytic effort beyond the scope of this review. However, we have highlighted below a number of errors, inconsistencies, and confusing statements in the Momeni report's discussion of exposure and dose. We will concentrate on the calculation of

2. This may in part be due to the dosimetric calculations carried out in the UDAD code (Momeni et al 1979), the computer code used for the radiological analyses.

doses to the potentially most exposed off-site resident under the no-reclamation option. The most exposed individual would be a Paguate resident who stayed in the village 24 hours a day for his entire life and whose entire annual meat intake came from cattle grazing on grass contaminated with airborne dust from the mine. Obviously very few, if any, Paguate residents fit this profile.

External Exposures

10-42 First, according to the Momeni report, the Paguate resident is expected to be the most exposed off-site individual, and the pathway producing the largest dose to this individual is exposure to ground-deposited radionuclides. Table 3.12 lists "70-year individual dose commitments" to the whole body and different doses to various organs from this pathway for the no-reclamation alternative. The use of the term "70 year dose commitment" is confusing since, unlike long-lived radionuclides that can remain in the body after ingestion or inhalation of contaminated materials, external exposure produces a dose at the time of exposure - there is no continuing committed dose. No further dose is received once exposure stops. If indeed Momeni calculates a continuing, lifetime (70 year) dose for external exposures, in Table 3.12, the units should be mrem/lifetime, not mrem/year. This would substantially overestimate (by a factor of about 70) the dose and resulting health effects from such exposures. Second, the UDAD code, which supposedly was used to calculate external doses to the whole body from external radionuclides, makes use of dose conversion factors for both ground-deposited and airborne radionuclides. However, according to the UDAD code, these dose conversion factors also apply to the internal organs; that is, each organ is assumed to receive the same dose from the same whole body exposure. Thus, the reason

10-42
(Cont.) for the different whole body and internal organ doses in Table 3.10 is unknown to us.

10-43 Third, the magnitudes of the calculated doses in Table 3.12 do not appear to be correct. The Momeni report suggests that radium-226 is the largest contributor to external whole body exposure from ground-deposited radionuclides, contributing 6.90 of the 7.12 mrem/yr total for the Paguate resident (see Table D.13, which gives more detail on the whole body doses shown in Table 3.12.) The report also suggests that the total concentration of radium-226 on the ground after 99 years of deposition is 4.47×10^4 pCi/m² (Table D.17). Because the UDAD dose conversion factor for ground-deposited radium-226 is 9.47×10^{-7} mrem/yr per pCi/m², the annual external whole body exposure from radium-226 deposited on the ground for 99 years should be (neglecting shielding by buildings):

$$(4.77 \times 10^{-4}) \times (9.47 \times 10^{-7}) = 0.042 \text{ mrem/yr.}$$

This indicates that the estimated annual dose of 6.90 mrem/yr shown in the Momeni report (Table D.13) is high by a factor of more than 150.

10-44 Fourth, the (X,Y) co-ordinates of Paguate are consistently shown as (+3 km, +1 km) whereas they should be (-3, +1). This may be just a reporting error but it could have affected the calculation of radionuclide concentrations at Paguate by the UDAD code.

Ground Deposited Radioactivity

10-45 Exposure to ground-deposited radioactivity is proportional to the amount of radioactivity on the ground surface. Our estimates suggest surface activities that are an order of magnitude lower than those estimated by Momeni. The calculation of surface

10-45(Cont.) activity according to the UDAD code makes use of a radionuclide removal half-life from soil to account for the way surface activity in the upper soil is affected by natural forces and mechanical actions (see Section 3.2.5 of the Momeni report). The UDAD default value for the removal half-life is 50 years (PHALF on p.D-12). However, the Momeni report uses a value of 10,000 years (p.D-7), or effectively no removal, which could account in part for the high predicted surface activity (Table 3.6).

Radon Exposures

10-46 The calculation of radon daughter exposure in the Momeni report (supposedly according to the UDAD code) is also confusing. Apparently, the concentration of radon daughters (expressed in WL) at a particular location is calculated by the equations of radioactive decay, with the time of radioactive decay equal to the transit time of the radon from the radon source to the location of interest. (No physical removal by other mechanisms (e.g. deposition on dust) is assumed.) The WLM exposure is then calculated by multiplying the WL concentration by 4.2 WLM/month (Table 3.10), including using a correction factor for indoor occupancy. On the other hand, the UDAD code calculates WLM exposure (and resultant lung dose) directly from the radon concentration by assuming a 0.5 indoor radon/radon daughter equilibrium factor indoors. We are uncertain what method is used in the Momeni report.

3.2 Pathways Model

In order to estimate the potential doses to the most exposed individual under the no-action alternative, we prepared a pathways model that examined the same exposure pathways examined in the Momeni report, namely, inhalation of airborne

radionuclides (radioactive dust and radon daughters), ingestion of contaminated beef (from beef cattle eating contaminated pasture grass), and external exposure to airborne and ground-deposited radionuclides. The estimates of airborne radioactivity provided by the Momeni report and the models and default parameters used in the UDAD code were used as inputs. It was conservatively assumed that the cattle grazed on grass at Paguate rather than at the more distant (and thus less contaminated) ranges.

The procedures used in our pathways model differed from the procedures used in the Momeni report in a few aspects. First, dose conversion factors obtained from a report of the International Commission on Radiological Protection (ICRP Publication 30, 1979) were used to convert intakes of radionuclides via inhalation or ingestion to dose. We used the ICRP dose conversion factors that assume worst case solubility of radionuclides in the body. The UDAD code generally uses dose conversion factors developed in older ICRP publications. Secondly, the most recent dose conversion factors calculated by Kocher (1983) were used to calculate doses from external exposure to ground-deposited and airborne radioactivity. These are about a factor of 2 or 3 lower than those used in UDAD. Third, exposure to radon daughters was measured in units of WLM.

Our pathways analyses estimate the annual whole body doses to the most exposed individual to be:

10-47

inhalation of particulates	5.1 mrem/yr
ingestion of meat	1.1 mrem/yr
external exposure	<0.01 mrem/yr
inhalation of radon daughters	0.012 WLM/yr

If, as suggested by the ICRP and the UDAD code, that 1 WLM is

approximately equivalent to 1 rem (1000 mrem) whole body exposure, then the radon daughter exposure is equivalent to 12 mrem/yr. The total estimated total whole body effective exposure is then approximately equivalent (on a risk basis) to an exposure of 18 mrem/yr. It should be noted that, because of the assumptions used, these are considered to be conservative (that is, they are likely to be high) estimates, particularly for the particulate inhalation and ingestion pathways. As per ICRP methodology, these estimated whole body doses reflect the expected total radiation risk to the most exposed individual under the no-action option.

10-47(Cont.)

It is not clear from the Momeni report (or UDAD documentation) if the whole body doses contained in the Momeni report are inclusive of the individual organ dose estimates given in the report (which is the case for our dose estimates shown above).

The whole-body estimates for the most exposed individual according to the Momeni report are:

inhalation of particulates (p.D-22)	0.22 mrem/yr
ingestion of meat (p.D-40)	1.1 mrem/yr
external exposure (pp.D-27 + D-33)	7.2 mrem/yr
radon daughters (p.D-24)	0.0053 WLM/yr

Thus, the total whole body dose according to Momeni is similar to our estimate, although the relative importance of the various pathways differ.

4.0 RISK AND HEALTH EFFECTS ESTIMATES

The Momeni report makes use of the PRIM code to calculate the number of potential, radiation induced cancer deaths resulting from exposures due to radiation released by the Jackpile-Paguate mines.³ The most important area in which the report is incomplete is in regard to the documentation of the PRIM code (shown as reference Momeni (1983a) on p.4-16). The Momeni report states that such documentation is in preparation although to our knowledge no documentation of the PRIM code has yet been published. It is difficult to review in detail the methodology used to estimate the number of potential health effects without such documentation. This is unfortunate since in our view this is the area in which the Momeni report appears to be most seriously flawed.

4.1 Individual Risk

We estimate that the most exposed individual would have a lifetime risk from exposure to radiation (other than radon daughters) of 4.2×10^{-5} or 0.004% chance of dying from cancer caused by living near the mine.⁴

3. Since the number of genetic effects is expected to be very small (less than 0.1 per 5 year period, p.4-14), only radiation induced cancer mortality is discussed here. In this manner, the main source of disagreement between the Momeni report and our estimates of the potential number of health effects can be highlighted.

4. The most exposed individual would receive an annual dose of about 6 mrem/year (excluding radon daughters). Using the ICRP risk factor of 1×10^{-4} per rem (lifetime risk of fatal cancer), one year of exposure to 6 mrem (6×10^{-3} rem) results in a lifetime risk of 0.6×10^{-6} . The total lifetime (70 years) risk would be $70 \times 0.6 \times 10^{-6}$ or 4.2×10^{-5} .

We estimate that the most exposed individual would have a lifetime risk from exposure to radon daughters of 8.4×10^{-5} or 0.008% chance of dying from cancer caused by living near the mine.⁵

The total lifetime risk to the most exposed individual, would therefore be in the order of $(4.2+8.4) \times 10^{-5}$ or about 1.3×10^{-4} (0.013%) chance of dying from cancer caused by living near the mine under the no-action option. For comparison, the present lifetime risk of dying from cancer in the United States is about 18% (American Cancer Society 1984).

4.2 Regional Population Risk

10-48(Cont.)

To estimate the regional population risk, it is necessary first to sum individual or group exposures over the entire population. Estimating exposures for all the population groups shown on Table 4.1 would require completely re-doing Momeni's calculations. Since our estimate and the Momeni estimate of total dose to the most exposed individual do not differ greatly (assuming Momeni's whole body dose calculations include the individual organ doses), it was decided to use the Momeni estimate of population dose i.e. the population dose commitment under the no-reclamation option as summarized in Table 3-8 of the DEIS.

5. The most exposed individual would be exposed to 1.2×10^{-2} WLM/yr. We consider for members of the public 1×10^{-4} per WLM to be an appropriate estimate of appropriate lifetime risk of fatal lung cancer from exposure to radon daughters (Evans et al 1981, SENES 1984). This leads to a lifetime risk of about 1.2×10^{-6} per year of exposure to radon daughters or, for a lifetime of exposure, a risk of 8.4×10^{-5} .

Table 3-8 of the DEIS lists population doses to the whole body and to a number of organs. These can be combined into a single effective whole body dose using organ weighting factors that are proportional to each organ's sensitivity to cancer induction from radiation. This methodology is used by the ICRP and the EPA, although the weighting factors used might differ slightly. It is not clear however, as discussed earlier, if the whole body doses given in the Momeni report include or exclude the doses listed for individual organs. For our purposes, it was conservatively assumed that the organ doses are excluded from the whole body dose. The resultant effective whole body dose is then 119 person-rem/yr.⁶

10-48(Cont.) For the 100 year period used to calculate long-term effects in the Momeni report, the total population dose is then about 11,900 person-rem. Using the ICRP risk factor of 10^{-4} fatalities/person-rem, this converts to a statistical risk of cancer of $(11,900 \times 10^{-4}) = 1.2$ or about one fatal cancer during the entire 100 year period. (The word "statistical" is important since it refers to an estimation of the probability of cancer; indeed, it is possible that no cancers would occur.)

4.3 Overestimates by the Momeni Report

The estimate of one fatal cancer in the regional population for a 100 year period for the no-reclamation option is much lower than the estimates given in the Momeni report, namely, 94.6 fatal

6. Multiplying the regional population organ dose estimates (Table 3.8 of the DEIS) by the ICRP weighing factors (ICRP 26 1977) give a total effective population dose of 119 person-rem/yr.

10-48(Cont.)

cancers using an absolute risk model (Table 4.7) or 243.2 fatal cancers using a relative risk model (Table 4.8). This observation leads us to conclude that the estimate in the Momeni report of the overall potential number of health effects due to the Jackpile-Paguate mines are too high by a factor of 100 to 200. It seems that the major source of this discrepancy is the translation of dose to health effects as carried out in the PRIM code.

5.0 The Multiple Land Use Reclamation Plan and the Air Source Term

In 1985, Anaconda prepared a multiple land use reclamation plan for the Jackpile-Paguate mine (Anaconda 1985). In brief, the essential elements of the multiple land use plan that affect releases to the air:

- ore and protore will be left in their present locations and stabilized. The exterior slopes of the piles would be graded and covered with 12-18 inches (average 15 inches) of cover;
- waste dumps would be regraded and covered with 12-18 inches (average 15 inches) of cover;
- the Jackpile pit and the South Paguate pit would be backfilled to avoid a free water surface;
- the North Paguate pit would be used as a storage reservoir.

Table B.1 (attachment B) summarizes the effects on the air source term of implementing the multiple land use plan as described above assuming only the minimum 12 inches of cover.⁷ The percentages in Table B.1 refer in all cases to the releases calculated in the Momeni report for the no-action alternative.

The reductions in the air source term were calculated as follows:

- releases of windborne particles are assumed to be eliminated by either soil cover or water cover;

7. This is a conservative assumption. Dr. Hersloff has calculated the effects of the Anaconda plan on radon and dust release using the assumption of 15 inches of cover. We assumed 12 inches in order to use Momeni's calculations regarding the effects of cover. Momeni did not calculate the effects of 15 inches of cover.

- release of radon to the air is assumed to be eliminated by water cover; and
- releases of radon to the air are assumed to be reduced by a factor of 0.59 (i.e. a reduction of 41%) by >12 inches of soil cover. This factor is taken directly from Table D.1 of the Momeni report.

From Attachment B, it can be seen that the multiple land use reclamation plan would reduce the radon release rate to about 62% of the release rate estimated by Momeni (see Table 3.1), for the no-reclamation alternative. The multiple land use reclamation plan would reduce the dust release rate to about 12% of the no-reclamation alternative release rate (i.e. a reduction of about 88% would be achieved).

10-49(Cont.)

Reclamation alternatives B to D discussed by Momeni involve covering all sources of airborne particles, which would result in a 100% reduction of the dust source term, compared to an 88% reduction in the dust source term achieved by the multiple land use plan. We infer from Momeni (Section 3.5.2) that alternative B would reduce radon release to about 59% of the no-reclamation alternative and that alternatives C1 to D would reduce the radon release to about 8% of the no-reclamation release rate.

The dose and risk implications of the no-reclamation alternative were discussed in Section 4.0 of this statement. If the multiple land use plan were to be implemented, we estimate that for the 100 year period the cumulative risk to the regional population would be reduced in proportion to the source term in radon and dust reductions noted above; that is, we would expect fewer than the 0.2 radiation-induced cancer deaths.

Recent recalculation of the air source terms by Dr. Lyda Hersloff suggests that the source terms used in the Momeni report (and

10-49(Cont.) hence in the DEIS) are a factor of 1.75 too high for radon and a factor of 2.38 too high for dust. Assuming this was indeed the case, the health effects estimates we have calculated are also too high by corresponding factors.

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TABLE B.1

SUMMARY OF AIR SOURCE TERMS FOR NO ACTION ALTERNATIVE
AND FOR MULTIPLE LAND USE ALTERNATIVE

Site ³	Area		No Action Alternative ¹		Multiple Land Use Alternative ²	
	Hectares	% total	Rn Release Ci/yr	% Total Release (%) ⁴	% Radon Release ⁵	% Dust ⁵ Release
Jackpile Pit	192.1	17.0	3476.6	62.2	36.7	0.0
Rail Spur	50.0	4.4	512.5	9.2	9.2	9.2
Jackpile Ore/ Protore	97.2	8.6	414.8	7.4	4.4	0.0
N. Paguate Ore/ Protore	58.6	5.2	373.8	6.7	4.0	0.0
S. Paguate Ore/ Protore	29.9	2.6	208.4	3.7	2.2	0.0
N. Paguate Pit	56.6	5.0	195.2	3.5	0.0	0.0
S. Paguate Pit	161.8	14.3	140.9	2.5	1.5	0.0
Roads	35.2	3.1	66.0	1.2	1.2	1.2
Jackpile Dumps	215.5	19.0	54.2	1.0	0.6	0.0
Other Facilities	25.6	2.3	43.9	0.8	0.8	0.8
17D	1.2	0.1	35.0	0.6	0.6	0.6
S. Paguate Dump	115.4	10.2	34.6	0.6	0.3	0.0
4-2	3.2	0.3	13.9	0.2	0.2	0.2
Topsoil	38.0	3.4	9.1	0.2	0.2	0.2
N. Paguate Dump	51.7	4.6	8.9	0.2	0.1	0.0
			5588		62	12

- Notes: 1. Based on data in Table 3.1 of Mumeni et al (1983).
 2. Derived from data for no reclamation alternative adjusted for multiple land use reclamation as described by Anacosta (1985) (see text).
 3. Sites were grouped into pits, ore/protore (>5 pCi/g U-238), waste dumps (<5 pCi/g U-238), topsoil and facilities as appropriate. Sites 17D and 4-2 could not be assigned.
 4. This ranking also applies to particulate releases.
 5. As % of no-action release.

POSITION

Vice President
Director of Nuclear Studies

EDUCATION

B.Sc. (Honours), Physics, 1968, University of Waterloo (University of Waterloo Tuitk Scholarship)
Ph.D., Physics, 1973, McMaster University (National Research Council Science Scholarship)
Two Sessions at the Advanced School for Statistical Mechanics and Thermodynamic University of Texas, Austin, 1970 and 1971
Air Pollution Diffusion, U.S. EPA, Research Triangle Park, 1974
Annual Health Physics Course, Chalk River Nuclear Laboratories, 1974
Observations on Human Populations, School of Hygiene, University of Toronto, 1979

PROFESSIONAL AFFILIATIONS

American Nuclear Society
American Physical Society
Canadian Standards Association, Member of Technical Committee on Environmental Radiation Protection (1978 to present)
Canadian Radiation Protection Association
Health Physics Society
Institute of Electrical and Electronic Engineers
New York Academy of Sciences
Ontario Air Pollution Control Association

EXPERIENCE

1980-date SENES Consultants Limited. Vice President and Director of Nuclear Studies with corporate responsibility for studies of environmental radioactivity and radiation protection. Also provides technical assistance to atmospheric dispersion studies and air quality analyses.

Senior health physics advisor for studies pertaining to worker radiation protection. Such studies have involved dose assessment and the development of health and safety practices for uranium mine workers, ALARA optimization of underground uranium mining, the assessment of co-carcinogens in the uranium mine work environment, dose reconstruction for epidemiological studies of persons exposed to elevated radon daughter concentrations, and evaluation of scientific basis for uranium mine regulations.

Senior scientist for several studies that utilized environmental pathways analysis and other modelling techniques to investigate the release, distribution, and effect of radionuclides in the environment.

Douglas B. Chambers

Pathways analysis has been applied to the decommissioning of uranium mines and the establishment of derived release limits for both an existing and future uranium refinery. Manager of a study which modelled the behaviour of carbon-14 in the biosphere.

Directed the assessment of radiological aspects associated with the decommissioning of uranium mining operations at properties in northern Saskatchewan and provided similar advice to a property in Ontario.

Project manager for several low level radioactive waste management studies including the evaluation of specific waste management sites and development of disposal concepts, application of pathways models to assist in site investigations, reviews of the current status and legislation of LLRW management in North America, preparation of LLRW inventories in Canada.

Directed and provided technical input to air dispersion modelling of accidental chemical releases (including dense gases); numerical air quality modelling for complex terrain, calibration/verification studies, and development of long-range transport models.

1973-1980 James F. McLaren Limited. General Manager, Nuclear Projects Division from 1977 to 1980. Responsible for the development of the firm's capabilities in the environmental radioactivity and radiation protection areas.

Project Manager in the Air Environment Division from 1973 to 1977. Responsible for projects in environmental radioactivity, air pollution control, and environmental noise.

Environmental advisor (air environment and/or radioactivity) on several environmental impact assessments. Assessments have been undertaken for the expansion of an existing uranium mining operation; multi-disciplinary studies to select a site for a new uranium refinery in Ontario; a site evaluation for a uranium hexafluoride conversion plant; proposed uranium mining operations at several locations across Canada.

Radioactivity specialist on studies of public and worker health impacts at several proposed uranium mining operations; for the handling of slag at a phosphorus reduction operation; a review of industrial hygiene practices at Canadian uranium mines and mills; and radiation protection in the design of a nuclear fuel fabrication facility.

Specialist advisor on the development, implementation and interpretation of results from air quality and meteorological surveys at several types of industrial projects at locations across the country. Such studies have often included the development and use of atmospheric dispersion models for evaluating environmental effects.

Provided expert testimony at public meetings, hearings and inquiries that have addressed uranium mine operation and expansion, radioactive material clean-up programs, and atmospheric dispersion.

Involved in the assessment of the impacts of noise from a variety of projects including an ethylene plant, a petroleum coker, an airport, a polyethylene plant, and two coal mines. Also assisted in the development of noise exposure criteria for a large overseas industrial complex and adjoining city and the application of models for predicting environmental noise levels.

Assisted in the preparation of national inventories for mercury, lead, beryllium and asbestos as part of a sources and atmospheric emissions program.

Douglas B. Chambers/3

1968-1973 McMaster University. Post-graduate studies related to research in thermodynamics of irreversible processes.

TECHNICAL PAPERS AND PRESENTATIONS

"A Pilot-Scale Optimization Analysis of Underground Uranium Mining in Elliot Lake" to be presented at the International Conference on Occupational Radiation Safety in Mining". Toronto, October 1984 (with L.M. Lowe, J.L. Chakravatti, K. Black).

"Design for Beta Radiation Protection in Mining and Milling of High Grade Uranium O.e." to be presented at the International Conference on Occupational Radiation Safety in Mining". Toronto, October 1984 (with J. Mernagh)

"Potential Co Carcinogens in the Uranium Mine Environment." to be presented at the International Conference on Occupational Radiation Safety in Mining". Toronto, October 1984 (with R. Marchant).

"Conceptual Design for Disposal of Uranium Refinery Wastes in Mined Limestone Caverns." Presented at Health Physics Society Annual Meeting, New Orleans, June 1984 (with G. Case, J. Davis, D. Moffet).

"ALARA Analysis for the Decommissioning of the Beaverlodge Uranium Mine and Mill Site." Presented at Health Physics Society Annual Meeting, New Orleans, June 1984, (with V.J. Cassaday, R.A. Knapp, L.M. Lowe, M.P. Fillion).

"Critical Receptor Pathway Analysis for the Decommissioning of the Beaverlodge Uranium Mine and Mill." Presented at Fifth Annual Conference, Canadian Radiation Protection Association, Banff, May 1984. (with V.J. Cassaday, L.M. Lowe and M.P. Fillion).

"Design for Radiation Protection in a High Grade Underground Uranium Mine." Presented at Fifth Annual Conference, Canadian Radiation Protection Association, Banff, 4 May 1984.

"TLV's for Non-Standard Work Schedules" Pollution Engineering, November 1983, (with L.M. Lowe).

"Long Term Dose Implications of Accidental Releases from Nuclear Facilities" Presented at Fall Meeting of Air Pollution Control Association, Ontario Section, September 12, 1983, Minett, ON (with D.W. Hopper and L.M. Lowe).

"Air Quality Model Validation Study". Presented at the Seventy-Sixth Annual Meeting of the Air Pollution Control Association, Atlanta, GA, June 1983 (with D.W. Hopper and J.P. Jarrell).

"A Model for the Regional Transport and Cycling of Carbon-14". Presented at the Health Physics Society Annual Meeting, Baltimore, MD, June 1983 (with J.M. Schärer and L.M. Lowe).

"Accident Dispersion Modelling - A Simplified Approach". Presented at the Seventy-Sixth Annual Meeting of the Air Pollution Control Association, Atlanta, GA, June 1983 (with D.W. Hopper).

"Calculation of Radiation Exposure in a Case Control Study of Lung Cancers in Port Hope, Ontario". Presented at the Annual Canadian Radiation Protection Association Conference, Toronto, ON, May 1983. (with G. Case and "Environmental Issues Related to Uranium Mining". Presented at the Canadian Nuclear Association Seminar on Uranium and Nuclear Issues, Toronto, ON, November 1982 (with D.M. Gorber).

"Overview of Uranium Tailings Management Practice". Invited paper presented at the International Conference on Radioactive Waste Management, Winnipeg, MA, September 1982 (with R.A. Knapp, B.G. Ibbotson, and L.M. Lowe).

"Assessment of Hypothetical Disposal Facilities for Canada's Low Level Radioactive Waste". Presented at the International Conference on Radioactive Waste Management, Winnipeg, MA, September 1982 (with A. Buchnea, L. Cabeza, E.J. Chart and L.M. Lowe).

"Environmental Considerations Related to Uranium Exploration". Presented at the Third Annual Conference of the Canadian Nuclear Society, Toronto, ON, June 1982 (with B.G. Ibbotson and V.J. Cassaday).

"Design for Radiation Protection in the Mining of High Grade Uranium Ore". Chapter 70 of "Radiation Hazards in Mining - Control, Measurements, and Medical Aspects", the Proceedings of the first International Conference, Colorado School of Mines, Golden, CO, October 1981 (with J. Mernagh and R.T. Torrie).

"The Use of Radon Risk Estimators in Evaluating the Effects of Uranium Mining and Milling Operations". Presented at the Health Physics Society Annual Meeting, Louisville, KY, June 1981 (with L.M. Lowe and R.B. Sutherland).

"Fuel Cycle Risks - The Front End". Presented to the Canadian Nuclear Association Seminar on Nuclear Power Risks in Perspective, Toronto, ON, May 1981 (with S.E. Frost and V.J. Cassaday).

"Potential Health Impacts of Enhanced Radiation Levels in Port Hope". Presented to the Second Annual Meeting of the Canadian Radiation Protection Association, Ottawa, ON, May 1981 (with L.M. Lowe, R.B. Sutherland and E.J. Chart).

"The Canadian Experience - A Review of Environmental Considerations Associated with Uranium Mining Operations in Elliot Lake". Presented at the operation Action UP Conference on Uranium Mining and Radiation Safety at Michigan Tech University, Houghton, MI, September 1980 (with D.M. Gorber and B.G. Ibbotson).

"Development and Use of Radon Source Terms in Environmental Impact Assessments of Uranium Mines and Mills". Presented to the Health Physics Society Annual Meeting, Seattle, WA, July 1980 (with L.M. Lowe, V.J. Cassaday, J. Nantel and J. Archibald).

"Radium in Water, Sources, Levels and Effects". Presented at the Annual Conference of the Ontario Section, American Waterworks Association, Toronto, ON, April 1980 (with D.M. Gorber and B.G. Ibbotson).

"Radiological Evaluation of a Uranium Mines Expansion - A Case Study". Presented to the American Nuclear Society, San Francisco, CA, November 1979 (with L.M. Lowe).

"Environmental Assessments - A Consultant's Viewpoint". Presented at the Canadian Nuclear Association International Conference, Toronto, ON, June 1979.

"Radiological Monitoring of Uranium Fuel Processing Facilities". Seminar at Environment Canada, March 1979.

"Environmental Factors Related to the Development of a New Uranium Refinery". Presented at the Eighth Annual Hydrometallurgical Meeting, Montreal, PQ, August 1978 (with J.P. Jarrell).

"Radium Removal - Perspectives for the Future". Presented to the Canadian Uranium Producers' Metallurgical Committee Workshop on Radium-226 Control, Ottawa, ON, October 1977 (with R.A. Knapp).

"Industrial Hygiene Survey of Uranium Mining and Milling Industry in Canada". Seminar at Canada Centre for Mineral and Energy Technology, Ottawa, ON, July 1977.

Taught course in Air Pollution Control Engineering at University of Toronto (Spring 1976, Spring 1977). Offered by Department of Civil Engineering to fourth year and graduate students.

"The Role of Noise in Environmental Impact Statements". Presented to a joint meeting of the PCAO and Ontario APCA, Toronto, ON, November 1976.

"Comparison of Environmental Factors Relating to Alternative Sites for a Nuclear Generating Station in New Brunswick". Presented at Environment II, Association of Consulting Engineers of Canada, Montreal, PQ, September 1976 (with R.D. Gillespie and E. Koczur).

"Noise Pollution". Seminar #4 - Man and the Environment, Conservation Council of Ontario, February 1976.

"Sources and Emissions of Atmospheric Mercury". Presented at the International Conference on Heavy Metals in the Environment, Toronto, ON, October 1975 (with D.M. Gorber and E. Koczur).

"Air Environment Review of Asbestos, Mercury and Lead". Presented at the Industrial Waste Conference, Toronto, ON, June 1975 (with D.M. Gorber and E. Koczur).

"Role of Consulting Engineer in Air Pollution Control". Seminar at Centre for Air Measurement Studies at Pennsylvania State University, 1974.

"Review of Noise in Canada - Attitudes and Levels". Presented at the Ontario - Quebec APCA Joint Fall Meeting, Ottawa, ON, 1974 (with E. Koczur).

"Stack Testing, Odour Measurement and In-plant Measurements". Joint seminar of the MOE and PCAO, Toronto, ON, 1974 (with E. Koczur).

"Review of Industrial and Environmental Noise Concerns". Presented at the AIME Fall Meeting, Hamilton, ON, 1973 (with E. Koczur).

Ph.D. Thesis Topic: "The Thermodynamics of Self-Organizing Systems". (Spring 1973) - (A new optimal principle in non-equilibrium thermodynamics was developed and subsequently applied to study self-organizing systems).

POSITION

Senior Environmental Physicist

EDUCATION

B.Sc. (Honours), Physics, 1969, University of Ottawa (University Bursar's Award, International Nickel Company of Canada Limited Scholarship)

Ph.D., Nuclear Physics, 1976, McMaster University (National Research Council Scholarship, McMaster University Postdoctoral Fellowship, National Research Council Industrial Postdoctoral Fellowship)

Annual Health Physics Course, Chalk River Nuclear Laboratories, 1978

PROFESSIONAL AFFILIATIONS

Canadian Association of Physicists
Canadian Nuclear Society
Canadian Radiation Protection Association
American Nuclear Society
Health Physics Society

LANGUAGE CAPABILITIES

English, some French

EXPERIENCE

1980-date SENES Consultants Limited. Senior environmental physicist participating in radiation pathways analysis, dose modelling, radiation risk analysis, epidemiological assessment, and studies of the environmental impacts, occupational health concerns and public safety aspects of radiation and radioactive materials.

Participant on several worker radiation exposure studies. Such studies have involved ALARA analysis of uranium mine ventilation costs, and the design, implementation, management and interpretation of worker monitoring programs at an operating phosphate ore refinery, a proposed uranium mine/mill complex, and a proposed uranium refinery. Project manager of a study to develop a computer mine ventilation model to predict radon daughter levels. Participant in a major study to evaluate the scientific basis for U.S. uranium miner radiation regulations. Prepared and presented introductory seminars on radioactivity to uranium exploration workers, and to company management and plant workers on the results and interpretation of monitoring programs.

Designs and oversees field programs that monitor background levels of radioactivity and concentrations of radionuclides in the environment. Projects include monitoring at a uranium exploration site in Nova Scotia, uranium properties in Saskatchewan and Ontario, and a uranium refinery site in Ontario. Participant in the development of a model to study the long-range transport and environmental cycling of carbon-14.

Provided major input into critical reviews of radiation exposure regulations including proposed revised (1983) AECB regulations, U.S. EPA draft standards on emissions from

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uranium mines, and proposed regulations in Florida related to low-level radioactive phosphate ore. Participated in preparation of written evidence to court hearing on a request to lower uranium miner exposure limits in the United States, and on a hearing to study temporary storage of radioactive soil in Ontario.

Major participant in site selection studies for low level radioactive waste disposal and assessment of effects of remedial plans for the removal of radioactive material. Involvement has included waste characterization, review of appropriate regulations, and radiation exposure pathways analysis. Participant in an epidemiological case study to assess effects of enhanced indoor radon levels and a study of co-carcinogens in uranium mines. Analysed radiological aspects of the decommissioning of a uranium mine and mill in northern Saskatchewan.

1977-1980 James F. MacLaren Limited. Physicist in the Nuclear Studies Group.

Deputy project manager and field supervisor of the search for and recovery of radioactive debris from the Soviet Satellite Cosmos 954 in the Northwest Territories.

Assisted in radiological assessments of environmental concerns and public and worker health aspects of proposed uranium mines and mills in British Columbia and Saskatchewan, and the expansion of existing mines in Ontario.

Involved in the design and implementation of field studies and remedial measures required for the radioactive decontamination of certain areas of Port Hope, Ontario. Participated in analyses of indoor radon gas characteristics.

Project manager for the radiation survey of certain highways in Québec built on phosphate slags that contain higher than normal levels of natural radioactivity.

Assisted in the review of the radiological monitoring requirements of uranium processing facilities in Canada.

1969-1977 McMaster University. Doctorate degree program in nuclear physics and postdoctoral research fellow. Thesis topic: Study of Hyperfine Quadrupole Interactions in Compounds of Hafnium by the Perturbed Angular Correlation Method. Teaching assignments included supervising first and second year physics laboratories at McMaster and tutoring a first year biophysics course (University of Guelph, 1975).

1965-1969 Temporary work terms included research on the fabrication and application of special refractory materials (Canadian Refractories Limited), research on the physics of ice (National Research Council), and studies on neutron detectors and associated instrumentation (Defence Research Board).

TECHNICAL PAPERS AND PRESENTATIONS

"Pilot ALARA Analysis Applied to Dose Reduction in an Underground Uranium Mine." Presented at the International Conference on Occupational Safety in Mining, Toronto, Ontario, October 1984 (with D.B. Chambers, J.L. Chakravarti, D. Lahoux, K. Black and K. Culver).

"ALARA Analysis of the Decommissioning of the Beaverlodge Uranium Mine and Mill Site." Presented at the Twenty-Ninth Annual Meeting of the Health Physics Society, New Orleans, Louisiana, June 1984 (with D.B. Chambers, V.J. Cassaday, R.A. Knapp and M.P. Fillion).

"Critical Receptor Pathways Analysis for the Decommissioning of the Beaverlodge Uranium Mine and Mill." Presented at the Fifth Annual Conference of the Canadian Radiation Protection Association, Banff, Alberta, April 1984 (with D.B. Chambers and V.J. Cassaday).

"TLV's for Non-Standard Work Schedules." Pollution Engineering, November 1983, pp. 36-37 (with D.B. Chambers).

"Long Term Dose Implications of Accidental Releases from Nuclear Facilities." Presented at the Fall Meeting of the Ontario Section of the APCA on Accidental Atmospheric Releases, September 1983 (with D.W. Hopper and D.B. Chambers).

"A Model for the Regional Transport and Environmental Cycling of Carbon-14." Presented at the Twenty-Eighth Annual Meeting of the Health Physics Society, Baltimore, Maryland, June 1983 (with D.B. Chambers and J.M. Scharer).

"Calculation of Radiation Exposure in a Case Control Study of Lung Cancers in Port Hope, Ontario." Presented at the Fourth Annual Conference of the Canadian Radiation Protection Association, Toronto, Ontario, May 1983 (with G.G. Case and D.B. Chambers).

"Overview of Uranium Tailings Management Practice." Presented at the international Conference on Radioactive Waste Management, Winnipeg, Man., September 1982 (with D.B. Chambers, R.A. Knapp, and B.G. Ibbotson).

"Public Health Effects of Radon From Uranium Mining and Milling." Presented at the Twenty-Sixth Annual Meeting of the Health Physics Society, Louisville, KY, June 1981 (with D.B. Chambers and R.B. Sutherland).

"Potential Health Impacts of Enhanced Radiation Levels in Port Hope." Presented at the Second Annual Meeting of the Canadian Radiation Protection Association, Ottawa, Ont., May 1981 (with D.B. Chambers, R.B. Sutherland, and E.J. Chart).

"Development and Use of Radon Source Terms in Environmental Impact Assessments." Presented at the Twenty-Fifth Annual Meeting of the Health Physics Society, Seattle, WA, July 1980 (with D.B. Chambers, V.J. Cassaday, J.H. Nantel, and J.F. Archibald).

"Radiological Evaluation of a Uranium Mines Expansion: A Case Study." Presented at the Twenty-Fifth Winter Meeting of the American Nuclear Society, San Francisco, CA, November 1979 (with D.B. Chambers).

"The Electric Quadrupole Interaction of Ta-181 in H_2HfF_7 ," Chemical Physics Letters, 46 (1977) 531. Also presented at the 1976 Conference of the Canadian Association of Physicists, Quebec City, P.Q. (with W.V. Prestwich).

"The Field Gradient Tensor at the Metal Site in Hafnium Acetylacetonate." Canadian Journal of Physics, 53 (1975), pp. 1327-1329 (with W.V. Prestwich and H. Zmora).

"On the Calculation of Electric Field Gradient Distributions in Perturbed Angular Correlation Measurements." Nuclear Instruments and Methods, 113 (1973), pp. 155-156 (with H. Zmora and W.V. Prestwich).

"Half-Life of the 482 keV Level of Ta-181." Canadian Journal of Physics, 51 (1973), pp. 1497-1498 (with H. Zmora and W.V. Prestwich).

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"Quadrupole Interactions in Hafnium Metal." Canadian Journal of Physics, 51 (1972), pp. 1505-1507 (with H. Zmora and W.V. Prestwich).

"Interaction Between Correlated and Uncorrelated Time-Interval Distributions in Start-Stop Time-to-Amplitude Converters." Nuclear Instruments and Methods, 105 (1972), pp. 461-466 (with J.F. Boulter and W.V. Prestwich).

"Quadrupole Interaction of Ta-181 in Hafnium Oxychloride." Canadian Journal of Physics, 50 (1972), pp. 2054-2057 (with H. Zmora and W.V. Prestwich).

Written Statement Concerning Radiological Source Terms at
the Jackpile-Paguate Uranium Mines

Prepared for Anaconda Minerals Company

By

Lyda W. Hersloff, Ph.D
Radiant Energy Management

My name is Lyda W. Hersloff. I reside at 10854 Diane Drive, Golden, Colorado and I have a Ph.D. in Radiation Ecology and two master's degrees, one in Health Physics and one in Ecology. I am presently self-employed as a consultant in the areas of radiation ecology and health physics. My personal experience includes environmental monitoring, licensing, and reclamation of uranium mines and mill sites. My research experience has included studies concerning radon emanation, and radon in underground uranium mines.

The source terms considered and evaluated include external gamma radiation, Radon-222, and airborne radioactive particulate releases from the Jackpile-Paguate Uranium mines. These releases are used to determine the projected exposures to populations in the vicinity of the mines as well as projected health effects. Several factors determine the total releases from any mine site. These include, among others, the acreages involved in and the radioactivity of the material.

Estimation of the amount of radioactive material released from a site is basically accomplished by multiplying the concentration of radioactive material, in this case uranium as determined by Anaconda Minerals Company, times the total acreage of the exposed radioactive source times a dispersion coefficient. The acreages used in assessing the source terms for the Jackpile-Paguate Uranium mine site were evaluated based on personal inspection, maps and aerial photographs.

10-50 At the Jackpile-Paguate Uranium mines, exposed uranium ore-bearing material is the Jackpile Sandstone, an easily identifiable material based on its whitish color. The area in the pits with remaining exposed Jackpile Sandstone material was found to be 158.6 hectares (392 acres). Other sources within the mine site include dumps, waste piles, protore piles and miscellaneous sources. The acreage associated with these sources was found to be 229.9 hectares (567 acres). Estimates by Argonne National Laboratory of the pit and dump acreages, however, were considerably greater with the pit area estimated at 409 hectares (1010 acres) and the dump, piles and miscellaneous areas estimated at 721.5 hectares (1782 acres).

10-51 Based on the estimated acreages of exposed Jackpile Sandstone and the uranium concentrations for the various exposed areas, the release rates of Radon-222 and airborne radioactive particulates can be calculated. In my analysis, the release rates of Radon-222 from the pits and dump areas were determined to be 2037.5 Ci/yr and 1033 Ci/yr respectively. Other miscellaneous sources, such as a rail spur and roads contributed 135 Ci/yr. The total estimated Radon-222 release rate is therefore 3205.5 Ci/yr which is 57% of the total Radon-222 release rate of 5587.8 Ci/yr as estimated by Argonne National Laboratory.

10-51(Cont.) Using the same method as described earlier, the airborne radioactive particulate emissions were estimated to be 0.43 Ci/yr. This release rate is approximately 42% of that determined by ANL of 1.02 Ci/yr.

10-52 The airborne radioactive particulate and radon releases estimated by Argonne appear to have been based on the original total acreages associated with Jackpile Sandstone in the pits at the Jackpile-Paguate mine site prior to mining. In addition, approximately 450 acres of dump site material, which is not classified as radioactive material and which has been covered by 12-18" of topsoil material, was included in the Argonne report as contributing to the mine source terms. Essentially there was no consideration in the Argonne report for backfilling and recharge the water within the backfill material following mining of the pits nor was there consideration for covering of several of the dumps. Since exposed acreage is one of the key factors in the estimation of release rates, the overestimation of acreage will necessarily result in the overestimation of release rates.

Anaconda Minerals Co. proposes to cover the dumps, waste piles, and protore piles with from between 12" to 18" of cover material. The pits will be backfilled with the backfill material also being covered with 12" to 18" of cover material. This depth of cover is estimated to reduce the average Radon-222 released to approximately 1458 Ci/yr. In addition,

recharge water coming into the pits is expected to fill within the backfill material thus covering more area of the exposed mineralized material in the pit areas. Since the pit areas are the major contributor to the release of Radon-222, it is anticipated that the Radon-222 released following final reclamation will be substantially less than the estimated 1458 Ci/yr. Covering of the exposed uranium ore-bearing material with 12" to 18" of soil will also essentially eliminate airborne radioactive particulates and the external gamma radiation resulting from the mine sources.



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STATEMENT OF BEN H. BOYD

Introduction

I am Ben H. Boyd and I am Morrison-Knudsen's Project Manager assigned to oversee the 1985 Anaconda Jackpile/Paguate reclamation alternatives study.

I have been involved in the mining industry for the past 20 years and hold a B.S. degree in Engineering Physics and a B.S. in Business Administration. I have been employed with M-K since 1979 and have the position of Project Manager for surface mine design projects. My responsibilities include conducting and managing feasibility and conceptual mine planning, volumetric calculations, equipment selection, production scheduling, and cost estimating.

Morrison-Knudsen Company, Inc. (M-K) is a publicly held firm founded in 1912. Our primary business is engineering, construction, mining operations and development of projects worldwide.

M-K has assisted Anaconda in the preparation of two previous reclamation planning efforts for the Jackpile/Paguate Mine area.

The first study was conducted in 1980 when Anaconda began preliminary plans for closing and reclaiming the mine area. The second study was a refinement of the initial plan and was performed in January 1982, after mining of the area was essentially completed. This second plan was presented to the DOI by Anaconda and was used as the basis for the draft EIS (DEIS) issued by DOI in February 1985.

In May 1985, Anaconda commissioned M-K to review and analyze the reclamation alternatives presented in the draft EIS. M-K performed a detailed evaluation of volumetrics, earthmoving methods and equipment requirements, material movement, project schedule, and a cost analysis of the DOI and Laguna options.

M-K also assisted in the development of a reclamation plan which addresses all essential elements of a responsible reclamation effort to restore the Jackpile/Paguate area. This plan involved assembling mining volumetrics for Anaconda's 1985 plan and all major related engineering necessary to complete the project. The 1982 reclamation plan, including the mining volumetrics and associated implementation engineering was also checked and updated. Cost analyses were completed for the four alternatives presented in the DEIS and 1985 Anaconda reclamation plan.

The other primary individuals involved in the 1985 Anaconda project include Burke Williams, John C. Roberts, Gay Bauwens, John F. Steiger and Russel Coata.

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Burke Williams is employed as a Senior Geologist with Morrison-Knudsen. Mr. Williams has a B.S. in Geology and is a registered geologist in the State of Idaho. Burke has nine years of experience including geologic field reconnaissance, data interpretation, and mine planning and design. He currently conducts mine-related feasibility studies for coal and hard rock projects, collects and interprets geologic data, performs mine design, planning, and sequencing, establishes reserves, and selects project equipment.

John Roberts has fifteen years of experience in project feasibility studies and operations mine planning. John has extensive experience in supervising mine crews and engineering staffs. He is currently employed as a project engineer for ongoing mine operations and prospective new operations. John has a B.S. in Mine Engineering.

Gay Bauwens is employed as a Senior Mine Engineer and has eight years of experience in mine planning and design, reclamation planning, equipment selection, production planning and water control for surface mines. Gay has a B.S. in Mine Engineering.

John Steiger holds a B.S. in Civil Engineering and has 22 years in cost estimating and engineering primarily for the mining industry. John's experience includes developing cost estimates for surface and underground mines, material handling systems, equipment selection and replacement schedules, determining manpower requirements and preparation of financial analysis.

Russel Coata holds a B.S. in Civil Engineering and has 23 years of experience as an Estimator, Cost Engineer and Materials Engineer on construction and mining projects worldwide. Russel has been heavily involved for the past five years in preparing cost estimates on mining-related projects in western U.S. and Alaska.

Volumetrics

M-K has calculated the volumetrics involved in meeting the specified requirements of the four proposed reclamation alternatives in the DEIS and the 1985 Multiple Land Use Reclamation Plan.

Cross sections were developed from 1" = 100' topographic maps of the Jackpile/Paguate Mine as necessary over the disturbed area to accurately reflect pre-mining, post-mining and post reclamation topography for each of the proposed plans. These cross sections were then used to calculate the volumes of material moved in each alternative. The average end area method was used. The methods employed provide results with an accuracy level of five percent to eight percent, and are widely accepted within the industry.

M-K has made a comparison of the volumetrics associated with the five alternative reclamation plans. The comparison included required backfill volumes for the three pits; Jackpile, North Paguate and South Paguate (includes SP-20 Pit), dump slope reduction and protore removal, overburden requirements, topsoil requirements, dozer/scrapper slope reduction and volumes to construct the DOI drainage channels. Depending on the reclamation plan,

the volume of material in each category can vary significantly. Total material moved for the five alternatives varies from 18.4 million cubic yards to 56.4 million cubic yards. Overburden and topsoil requirements between the five reclamation plans does not vary to any great extent. Required backfill also does not vary significantly for four of the alternatives, 10.5 million yards to 12.3 million yards. The Laguna backfill requirements are much higher due to the requirement of backfilling the South Paguate Pit and SP-20 Pit to original premining topo and the buttressing of the North Paguate highwalls. A distinction should be made between required backfill and backfill that is actually placed back into the pit areas. Required backfill is the volume of material necessary to backfill the pits to within the specified limits of the projected recharge water level. The backfill that is placed into the pits may be in excess of the required backfill, dependent on the dump slope modifications and the criteria for disposing of this material in a particular alternative reclamation plan.

Results of volumetric calculations conducted by M-K during 1980 and 1982, and check calculations by Anaconda, generally agree for comparable areas calculated during this study.

10-53 We have reviewed existing and post-mining surface contour maps provided by the DOI which were used as one basis for their volumetric calculations. The present condition contour maps prepared by the DOI appear to be in agreement with Anaconda mapping when adjustments are made for the datum difference. The post reclamation surface configuration maps provided by the DOI were difficult to interpret and the majority of the maps were unusable for purposes of our analysis. Using the descriptions in the DEIS and as much of the DOI provided mapping as possible, we can find no apparent basis for the rather large differences between the M-K volumetric calculations and those reported by the DOI. Additional DOI volumetric calculations and documentation will be necessary to further address these differences.

The Anaconda reclamation proposal submitted in the 1982 "Green Book" plan as calculated by M-K is significantly less material movement than the DOI interpretation of the 1982 Green Book Plan. M-K has also concluded that the DEIS overstates the amount of material movement for the DOI options.

Comparing M-K's total material movement for the four alternative reclamation plans with the DOI total material movement, M-K estimates are 23 percent, 20 percent and 10 percent lower than the DOI estimates for the 1982 "Green Book" plan, the DOI monitor option, and the DOI Drainage option respectively. M-K estimate is one percent higher than the DOI on the Laguna Reclamation Plan.

Differences exist between M-K's volumetric calculations and the volumetric results and conclusions presented in the DEIS. The more important differences are:

- 10-54
1. The DOI specifies reclaimed areas will be 40 to 70 feet higher than calculated by Anaconda for the 1982 plan. This appears to be an overestimation by DOI, resulting from possibly erroneous calculations within the computer modeling completed by the DOI. Each one vertical foot of material added to the backfill areas of the three pits will result in a minimum movement of 350,000 cubic yards of additional material. As the

lateral area backfilled increases, the volume of fill for each one-foot lift will increase to a maximum of 700,000 cubic yards of material per foot added across the entire pit bottom for the three pits.

An additional 40' of backfill would require movement of approximately 14 to 28 million cubic yards of material. A 70-foot rise would require approximately 24 to 49 million cubic yards of additional material. The 1982 Anaconda Plan as calculated by M-K results in a close balance between required backfill and surplus material from dump slope reduction. M-K has been unable to locate the additional material included by the DOI.

- 10-54(Cont.)
2. The DOI calculated that 973,000 loose cubic yards of material must be moved to construct drainage channels for all of the reclaimed mine areas in the drainage option. The hydrologist report prepared by the B.I.A. supporting the drainage option states 22,000 cubic yards of material must be excavated to construct the Jackpile drainage channel. The drainage channel volumes do not appear consistent. Overestimation by DOI of backfill into the pits could have resulted in an inaccurate estimate of the actual volumes required to construct the drainage channels (i.e., the channel excavation volumes may be based on the 40 to 70 feet of higher backfill stated by the DOI).

The proposed drainage channel routes for the North and South Paguate Pits were not available from the DOI. M-K located the proposed drainage channels based on what we believed as the most economic route and required the least excavation of material. M-K calculates the total required channel excavations for the Jackpile, North Paguate, South Paguate and SP-20 Pits at 4,900,000 cubic yards.

3. The DEIS indicates that dump slope reduction is essentially eliminated in the Laguna proposal because of the specified backfill. However, M-K has determined the reduction in required dump slope work, as a result of dump removal to backfill South paguate Pit, is less than five percent. Our calculations indicate that dumps in the vicinity of South Paguate Pit contain more than enough material to meet the requirements. All other dumps would still require some recontouring.
4. DOI has greater volumes than Anaconda for stockpiled protore material. M-K is unable to account for this excess of material.
5. A comparison of M-K and DOI backfill estimates for the four alternatives resulted in M-K requiring 11 percent, 7 percent and 7 percent additional backfill for the 1982 plan, DOI monitor and DOI drainage plans respectively. M-K required 11 percent less backfill than the DOI for the Laguna plan.

Earthmoving Methods and Equipment

In determining the methods and type of equipment to be used for the alternative reclamation plans, M-K has conformed with acceptable industry practices regarding equipment costs and operations viability. M-K has utilized the range of operations experience of the individuals working on the project and an extensive database derived from historical contract mining operations.

In determining the type of equipment and methods to be used on the alternative reclamation plans, M-K has made extensive comparisons of various types and sizes of equipment. This comparison involved the following subjects:

- o Hourly operating costs
- o Equipment capacities
- o Equipment production rates
- o Capital costs
- o Historical costs on repair and service
- o Availabilities
- o Operations practices

Equipment examined included a comparison of front-end loaders with hydraulic shovels loading various sizes of end dump trucks and large bottom dump tractor/trailer combinations. Also examined were the operations which would allow the use of scrapers and track-type dozers. Many other less flexible types of equipment were looked at, such as electric shovels, small draglines and conveyors. The nature and complexity in performing the reclamation of this mine and the large extent of property area that has been disturbed requires the more mobile and versatile equipment fleets.

The results of these comparisons are: M-K proposes the use of hydraulic shovels loading 85 ton end dump trucks, supported by track type dozers on the dump slope reduction. One of the alternative plans also utilizes push/pull scrapers for much of the backfill and dump slope reduction material.

The choice of equipment by the DOI for reclamation alternatives are common pieces of equipment, and are considered acceptable, but would probably result in higher operating costs.

Material Movement and Schedule

Having determined the volume of material to be moved in each reclamation plan and the method and type of equipment to be utilized, the final engineering tasks were material movement and scheduling.

M-K determined where the required material, whether it is backfill, overburden or topsoil, is being removed and where the material is being placed. M-K has attempted to pick the most economic haul profiles and routes of material movement, which is sometimes affected by what material is available and the type of material required. These reclamation plans can be considered workable cost effective designs.

Computer simulated haul cycles were developed for all of the various haulage routes for each reclamation alternative. These haul cycles require inputting the volumes, loading rate, haul lengths, grades, rolling resistances and speeds into the computer, which then generates the cycles times, number of haul units required on the haul and production per hour per haul unit. Additional information is generated on these simulations to aid in cost estimating. M-K developed in excess of 500 computer simulated haul cycles for the 1985 reclamation plan and the four plans presented in the DEIS to adequately address each item of material movement.

M-K determined the time and the number of units of equipment that are required for the various dump slope reductions and reclamation tasks. From this point the schedule of material movement was developed to determine:

- o Number of loading units required
- o Number of haulage units
- o Number of dozers required
- o Operating hours and labor shifts for the equipment
- o Year the reclamation item occurs
- o Support equipment requirements such as motor-graders, water trucks, drills, service equipment and light plants

The objective of the schedule was to complete as much reclamation work per year with a particular fleet of equipment and not have a large fluctuation in the required number of loading or hauling units. M-K has scheduled the operations so the truck fleet is balanced with the loading units to prevent long periods of truck idle time, or times when there is a deficiency in the number of trucks.

The five alternative reclamation plans vary in time for completion from just under two years to four years. Shovel requirements range from one to three shovels operating with five to fifteen trucks, respectively depending on the reclamation plan. A spare front-end loader is utilized at times within some of the alternative reclamation plans.

M-K has reviewed the limited data prepared by the DOI concerning equipment requirements and methodology. M-K has differing views on the methods and assumptions utilized by the DOI in determining:

- o Equipment production rates
- o Equipment requirements
- o Manpower requirements

Many of the DOI assumptions and methodology are not usually utilized in the industry.

In a reclamation job of this complexity, detailed haulage cycles are required to accurately determine loading and haulage equipment requirements. Weighted average haul distances, apparently used in the DOI estimates cannot give a realistic picture to develop equipment schedules and a cost estimate.

In determining hourly dozer production rates, the average push distance forms a major component of the hourly production. To apply the same push distance for all of the dozer work on a project this size will give very generalized dozer requirements and costs. An average push distance of 500 feet as reported by the DOI is higher than the majority of the distances used by M-K. A push distance of 500 Feet is reaching the upper limits of efficient and economic use of a dozer.

When determining the equipment requirements of the loading and haulage fleets and the duration of the project, it is necessary to develop a schedule of the operations on a monthly and annual basis. By combining the reclamation items having short hauls with items having long hauls, less equipment is required and the equipment in operation is better utilized.

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MORRISON-KNUDSEN COMPANY, INC.

M-K has not received any schedules of material movement on the alternatives costed in the DEIS. The number of loading, hauling and dozer unit provided in the DOI manpower requirements appears to be overstated and oversimplified compared to common practices within the industry.

Cost Analysis

M-K has prepared capital and operating cost estimates for implementing each of the proposed reclamation plans. Care has been used to assure that each of the plans is estimated on a comparable basis. Equipment types are changed as appropriate for the elements of each alternative.

M-K estimated the total cost of completing the four reclamation alternatives presented in the DEIS. M-K cost estimates are 25 percent, 22 percent, and 14 percent lower than the DOI estimates for the 1982 proposed reclamation plan, the DOI monitor plan and DOI drainage plan respectively. M-K's costs are 18 percent higher than the DOI for the Laguna reclamation plan.

The cost variance between the lowest and highest of the four DOI estimates presented in this DEIS reclamation alternatives is only six percent. The variance of total material moved between the lowest and highest of these four alternatives is 46 percent.

M-K is concerned with the narrow range of total reclamation costs for the four alternative plans the DOI has costed compared to the wide range of total material movement.

M-K has reviewed the limited cost data provided by the DOI. The dozer and scraper cost per cubic yard of material remains the same independent of the operation or haul distance. The hourly production per haul truck also appears to be generalized for the wide variation in haul distance and fleet requirements.

The cost summaries appear to be very generalized for this complex of a reclamation effort. The DOI estimates would apply more to an order of magnitude type cost estimate.

M-K feels comfortable that the cost estimate we have prepared falls within industry standards for estimating mining and construction projects. M-K can not speculate on what the level of accuracy is for the costs presented in the DEIS.

In summary, the data and mapping prepared by the DOI for the DEIS was very limited and difficult to interpret. M-K has attempted to reconcile the differences in the volumetrics between alternatives but has had little success. Additional back-up data and mapping relating to each reclamation alternative is necessary to further address the volumetric variations and reclamation costs.

10-55(Cont.)

STATEMENT OF FRED C. KELSEY

My name is Fred Kelsey. I am currently employed by Anaconda Minerals in the capacity as a mining systems analyst. My college background includes training in the fields of geology, geophysics, and computer science.

My current work with Anaconda encompasses the feasibility, evaluation, design, development, operation and maintenance of computer systems used by the Geology, Mining Technology, and Evaluation Departments. My work also involves geostatistical reserve calculations, mine modelling, and participation in evaluation projects relating to potential mine or reserve acquisitions.

My assignment was to reconstruct the digitized topography that was provided by the BLM, reformat the data into a form that was suitable for use by Anaconda's various computerized surface mine planning systems, and validate the data.

A chronological account of Anaconda's attempts to secure the data necessary to evaluate BLM's volumetric calculation follows.

A letter requesting copies of the computer tapes containing all digitized Jackpile-Paguete topography data was sent to the BLM on March 22, 1985. On the third week of April, I received two computer tapes from the BLM's Denver Office. According to the BLM the tapes contained the 1984 topography data, 1951 topography data and the post reclamation topography data. However, these tapes turned out to be unusable due to incompatibilities between the computers used by Anaconda and the

BLM. I therefore requested the data in a format compatible with the Anaconda computers.

On May 10, 1985 I received two usable tapes containing part of the 1984 digitized topo data from the BLM. On May 13, 1985, I received two more tapes containing the remaining 1984 topo data and the 1951 topo data. In early June I requested topo data that was either missing or totally wrong in the tapes received in May. I received this data on July 2, 1985.

10-56 | Anaconda Minerals Company has not received to date the computerized post reclamation digitized contour data even though our original request was made five months ago.

10-57 | After receiving the topo data I made several verbal requests of the BLM technical consultants to send me explicit instructions on how to decipher the computer tapes. The only information they could give was that the topo data was in the UTM coordinate system. As a result of this lack of documentation, I spent a considerable amount of time and effort creating computer programs to modify the topo data into a usable format.

The following procedures were used to convert the BLM data into a format from which contour maps could be generated.

10-58 | First, the data was converted to the New Mexico state plane system. Then the coordinates of each topo point given had to be adjusted to give true coordinates based on an algorithm that originally took considerable time to assemble. The elevation for each point was then averaged with all other

10-58(Cont.) points within 0.3 feet. The reason for this step was that the original points were split into two points having elevations 5 feet above and below the correct elevation. Finally, the data was contoured using a computerized contouring program. Any bad elevations showed up as elevation anomalies and, therefore, were usually easy to detect.

After correcting the major errors in the contour elevations the data was reduced. This reduction of data did not affect the computerized contouring results when compared with the BLM supplied topography maps. However, this data reduction did decrease the computer run times. Before data reduction there were over three million topo points. After data reduction the same computerized contouring results were achieved with less than 800,000 points.

10-59 I found two basic types of errors within the BLM topo data. The first error was that of missing blocks or where the topo data in the blocks was totally wrong. This type of error represented a small but significant portion of the 1984 and 1951 topography data. This type of error was very easily identified. The second type of error was where the elevations along a contour line were wrong. Almost every block of data had this type of error to varying degrees. Computer maps showing most of the above two types of errors were generated by Anaconda. Computer maps showing the corrected topography were also generated.

10-59(Cont.) It appears that the BLM did not find the topography errors that I have mentioned. I find it surprising that BLM did not notice these errors because anyone with any experience in surface contouring packages should have been able to detect them. These errors may be contributing factors in the discrepancies between Anaconda and the BLM in volumetric estimations. It is impossible to quantify the effect that the topography errors would have had on the BLM volumetric studies. Because of questions that arise from the errors found, the reliability of the digitized computer data is highly suspect. To continue further analysis with this data would require a detailed comparison between the digitized computer data and the topography maps that were supplied by BLM. Since we never received the post reclamation topography and due to the problems found with the computerized data, it was unrealistic to proceed any further with computer analysis of this data.

STATEMENT OF
DR. BEN L. SEEGMILLER

Seegmiller International
Salt Lake City, Utah

I. INTRODUCTION

WORK PERFORMED BY SEEGMILLER INTERNATIONAL

Seegmiller International has performed a wide variety of projects at the Jackpile-Paguete Uranium Mine. The projects include detailed geotechnical studies of the Northeast Jackpile and Southwest Paguate areas for slope stability optimization in 1979. These two studies involved field mapping, core drilling and logging, laboratory strength testing and slope stability analysis. Joints and bedding planes were mapped in the field and the results were analyzed by computer assisted methods. The most probable slope failure modes were investigated. Oriented drill cores were taken and they were logged in detail for joints and bedding planes and for geotechnical strength parameters. Strength tests were also conducted and the rock mass was characterized for shear strength. The field and laboratory results were then used to analyze the stability of the mine slopes during and after mining. Modifications in the mining plans were recom-

mended as were methods for improving future stability. Also in 1979, a subsidence study of the Paguate Mine was conducted. The study involved a determination of the height of mining, the height of the existing openings, the thickness of the overlying strata and the amount of surface subsidence that could occur. Both field measurements and laboratory strength testing were undertaken. Detailed analyses of stability, relative to stable arches and surface displacements, were completed. In 1980 a stability study of the Jackpile Highwall was completed, as well as a study of dump stability. The Jackpile Highwall work involved field mapping, strength evaluation and stability analyses using the Hoek method. Stability analyses were performed on four different sections through the highwall. The dump study included field examination, sample collection and analyses by the Hoek method. In 1981 a major study of subsidence of essentially all underground stopes was conducted. The study involved field evaluation and stability analyses to determine whether or not subsidence would occur and the magnitude of the potential subsidence. Also in 1981, a comparative study of natural stopes and mined highwalls was completed. The study involved field measurements, field strength appraisal and stability analysis. In 1982 a reevaluation of the subsidence potential for the PW 2/3 Mine was completed. Field measurements of stope size and determination of the thickness of overlying strata was undertaken.

Stability analyses for stable arch size and potential magnitude of subsidence were performed. In 1983 a detailed slope stability study for the North Paguate area was undertaken. Sixteen different sections through the pit area were developed showing rock type and detailed geotechnical character. Field samples were collected and strength tests were performed. Using the Hoek method, a safety factor against slope failure was developed for each section. In 1985 further stability studies were completed for the Jackpile Highwall, selected individual dumps and the North Paguate pit. These studies involved many detailed field examinations, field testing and extensive computer assisted stability analyses. For these latter studies, an analysis methods comparison was performed. Hoek, Modified Janbu, Modified Bishop and Morganstern-Price methods were compared. Using the very accurate and conservative Modified Janbu and Modified Bishop methods, more than 6,000 individual analyses were performed on highwalls and waste dumps. In all of the referenced studies from 1979 through 1985, detailed field work was completed. Rock and soil units were examined and strata were mapped for joints, bedding planes and other geotechnical characteristics. Drill cores were logged and tested for various strength parameters in the laboratory. In all cases detailed data analyses and detailed stability analyses were conducted. All in all, from the period starting in November 1978 through August 1985 some

fifteen detailed geotechnic studies of stability were performed by Seegmiller International at the Jackpile-Paguáte Uranium Mine.

PERSONNEL INVOLVED IN WORK

Dr. Ben L. Seegmiller and Mr. Robert P. Sharon are the Seegmiller International employees who have performed the stability analyses regarding the Jackpile-Paguáte Mine. Dr. Seegmiller is the Principal Consultant for Seegmiller International. Dr. Seegmiller has undergraduate degrees in both mining engineering and geological engineering. In addition, he has a Masters degree in Mining Engineering and a Ph.D. in Mining Engineering from the University of Utah. Dr. Seegmiller is a registered professional engineer in ten states and a full member of the Society of Mining Engineers, the American Society of Civil Engineers, the Canadian Institute of Mining and Metallurgy, the Association of Engineering Geologists and the Utah Geological Association. He has consulted on a wide variety of slope stability problems for both mining and civil applications. Included in his consulting work have been assignments in Chile, Sweden, Canada, Mexico, Zaire, Ivory Coast, Liberia, the People's Republic of China, as well as many different locations in the United States. He has written and presented numerous technical papers on the subject of rock mechanics in mining. Included among these technical papers are

feature articles in *Mining Engineering*, *Mining Congress Journal*, *Engineering and Mining Journal* and *World Mining*.

Dr. Seegmiller supervised all field and laboratory work performed in connection with studies of the Jackpile Paguate Mine. He personally conducted more than 15 days of field work and supervised and reviewed all laboratory testing of materials. He performed all calculations for slope stability analyses, designed modifications and mitigated measures to improve high-wall and waste dump slope stability.

Robert P. Sharon is a Geological Consultant for Seegmiller International. Mr. Sharon has a technical degree in Geology from Bakersfield College and a Bachelor's degree in Geology from the University of Utah. He has been employed in mine planning with Kennecott Copper Corporation and in geological exploration with All Minerals Corporation. He became associated with Seegmiller International in 1980 and has since been involved in field discontinuity mapping to assess highwall stability, rock and soil sample collection and laboratory testing, emplacement of piezometers for rock stability determinations and computer assisted design and analysis for determining optimum pit slope angles. Examples of Mr. Sharon's assignments include Anaconda's Jackpile and Paguate Mines, Getty's Mercur Gold Mine, Kaiser Steel's Eagle Mountain Mine, Energy Fuel's uranium mines in

Arizona and the Cyprus Northumberland Mine.

For the Jackpile Paguate Mine studies, Mr. Sharon was involved in field data collection including detailed strata mapping and sample collection. He assisted in the laboratory rock and soil testing and performed detailed geotechnical descriptions of rock samples.

II. CONCLUSIONS REGARDING STABILITY OF THE GAVILAN MESA (JACKPILE) HIGHWALL

The initial study of the Gavilan Mesa Highwall stability indicated that under the assumed strength, the highwall might have a safety factor less than 1.5 unless buttressed. The analysis method that was used is known as the Hoek method. It is a simple and easy to perform method and gives more conservative answers than other methods. The buttressing that was designed by Seegmiller International and incorporated in Anaconda's Green Book Reclamation Plan would increase the minimum potential safety factor to at least 1.5 by the Hoek method.

The stability reevaluation conducted in May 1985 involved much more detailed field work and rock mass strength evaluation. The initial work has assumed that the sandstone rock units has a cohesion of only 4,000 psf. Subsequent studies on similar rock units in the North Paguate pit indicated that the sandstone

cohesion should be at least 6,000 psf. Additional field work and a rock mass analysis conducted in the later study show that the rock mass cohesion of the 3rd Sister sandstone is 6,000 psf. The cohesion of the 2nd and 1st Sister sandstones is 8,500 psf and the cohesion of the Dakota Sandstone and adjacent silty sandstones are 20,000 psf and 17,000 psf, respectively. The shale units are assumed to have the originally assumed cohesion of 2,500 psf. In addition, the later study used much more sophisticated and accurate stability analyses methods including the Modified Janbu and the Modified Bishop. Using these more detailed and accurate methods, a safety factor greater than 1.5 was demonstrated by both methods without a buttress. When a buttress is used, the safety factor is increased beyond 1.6 and is thus more conservative than required to assure long-term stability of the highwall. Therefore, very detailed and accurate analyses methods demonstrate that a buttress is simply not required to achieve the desired safety factor of 1.5. The highwall configuration suggested by DOI would even be more conservative because they propose to have the highwall slope profile modified. Such a configuration is unnecessary for purposes of stability.

DOI reviewed the original Seegmiller International work and concluded that it was not feasible to reclaim the highwall to a state of absolute stability, that a safety factor of 1.5 is more than adequate and that a safety factor as low as 1.4 would

be acceptable. Therefore, in light of the new strength information and the new and more detailed analysis results, the highwall may be regarded as stable over the long-term. Only if permanent structures occupied by humans, such as a school or hospital, were located at the base of the highwall would a safety factor greater than 1.5 be justified.

Common industry practice is to leave highwalls at the same angles as they were mined. In some cases highwalls have been left at 30°, 45°, 55°, 60° and even as steep as approximately 80°. For example, the Windfall Canyon Mine, just outside the city limits of Eureka, Nevada, has been personally observed to have sedimentary rock slopes of 65° over heights of approximately 300 feet. These slopes have been stable for 10 to 15 years with no signs of failure. Another personal observation example is the Thornton Quarry in the suburbs of Chicago, Illinois, where sedimentary rock is mined with slope angles on the order of 80° over slope heights of approximately 260 feet. Mining began in the Thornton Quarry in 1837 and no significant slope failures have occurred in the past 148 years. Ultimate depth of the slopes are planned at approximately 400 feet and the slope angles will be in excess of 60°. The quarry is surrounded by numerous roads and a freeway and a residential area is immediately adjacent to the mined slopes. Mining is expected to continue for another 100 to 150 years and the quarry slopes are believed prudently

stable even in view of the adjacent freeway and residential area. By comparison, the Gavilan Mesa Highwall will have an approximate slope of only 47° and no occupied structures or facilities will be nearby.

10-60 The reasons for the DOI contrary conclusions are not certain. Their technical studies do not fully explain the basis for why they think the Mesa is unsafe. However, it would appear that they did a worst case analysis on a single cross-section rather than several cross-sections. As such, unrealistic conclusions could result about overall stability for the Mesa. In addition, they have assumed cohesion values of 50% of laboratory values, but have not stated what laboratory values were assumed. The use of cohesion values of 50% of actual laboratory results for sandstone and shale materials would yield safety factors on the order of 5 to 10+ for the Mesa. If DOI selected values that were 50% of the SEEGMILLER values, then their analysis is grossly conservative. For example, the Sisters sandstone has a laboratory cohesion of 865 psi or 124,560 psf as determined in the original North Paguate study. If the DOI used 50% of these values, which are the SEEGMILLER laboratory values, then the sandstones would have cohesions of more than 62,000 psf. The SEEGMILLER analysis values were not laboratory values, but values for the actual rock mass based on past experience, other mining operations in similar materials, a rock mass strength analysis and laboratory testing.

10-61 The analysis method used by DOI is the Morganstern-Price method. This analyses method is extremely time consuming and cumbersome to use. Detailed force function values must be assumed for each and every computer run that is made on a single failure surface. Specific rules must be applied to each "solution" to determine if it is an "acceptable" solution. The Morganstern-Price method was used by SEEGMILLER in their 1985 work for comparison purposes. The results showed that of four different methods[Hoek, Modified Janbu, Modified Bishop and Morganstern-Price], the Hoek method was the most conservative and the Morganstern-Price method was the least conservative. The other two methods, which are the primary analyses methods used by SEEGMILLER, are both more conservative than the Morganstern-Price method and yet much easier to use. Hundreds of Modified Janbu and Modified Bishop analyses may be performed in the same amount of time that a single acceptable Morganstern-Price solution would require. Consequently, the final results produced by the Morganstern-Price method may be very limited and the accuracy is always questionable. In August 1985 SEEGMILLER conducted a limited survey of state agencies in New Mexico, Indiana, Colorado, California, Arizona and Utah. The survey indicated that the Modified Janbu and Modified Bishop analyses methods are the standard for stability analysis. Not one state agency[highway or mining regulatory] in any state is known to use the Morganstern-Price method.

10-62 | The DOI configuration may be difficult, expensive and dangerous to construct exactly as shown. The problem with the proposed configuration is that the working space for men and equipment is very narrow and only small-sized construction equipment could be used. Such small-sized equipment would be costly, require more men and, in general, produce unsafe working conditions.

III. STABILITY OF THE NORTH AND SOUTH PAGUATE HIGHWALLS

10-63 | Although DOI again uses their overly conservative conclusions in calculating the safety factors, they agree with the SEEGMILLER analysis and conclude that the highwalls are stable. In effect, there is a major inconsistency in the DOI work because one of the slopes in the South Paguate was computed by SEEGMILLER using the Hoek method to have a 1.4 safety factor. The original SEEGMILLER work on the Gavilan Mesa Highwall, using the Hoek method, also gave a safety factor of approximately 1.4. The 1.4 safety factor in the South Paguate area was, however, completely acceptable to the DOI, while a 1.4 safety factor[without buttress] was not acceptable to DOI for the Gavilan Mesa Highwall.

10-64 | Detailed studies in July 1985 of the North Paguate highwalls, along three different cross-sections, show that these slopes will remain stable even if a portion of the pit is used

10-64(Cont.) for water storage. Some 3,000 individual analyses, using the Modified Janbu and Modified Bishop methods, show that the slopes will have safety factors in excess of 1.9 under dry or water storage conditions.

IV. STABILITY OF THE PROPOSED WASTE DUMP SLOPES

The waste dumps, as they are presently configured, all have safety factors on the order of 1.5, except for FD-2 Dump. FD-2 Dump has an estimated safety factor of only about 1.05 to 1.1. The planned regrading of the dump slopes to the profiles examined in the SEEGMILLER studies would yield safety factors in excess of 1.6 for many of the dumps. In actuality, the 1985 Multiple Land Use Reclamation Plan would result in even flatter overall slopes for some of the dumps and the safety factors would increase in a number of cases to in excess of 2.0. These high safety factors are more than sufficient for stability in the long-term.

10-65 The DOI analysis of waste dump stability, which predicts failure of the dump slopes is based on the wholly erroneous assumption that the waste dumps will lose their cohesion over time. In fact, the DOI analysis predicts that the waste dumps will have as little cohesion as a sand dune. Given the character of the rock and soil in the waste dumps, the atmospheric moisture

10-65(Cont.)

and the time element, the dumps will actually consolidate and have an increase in cohesive strength over the long-term. Such consolidation commonly occurs in soil embankments emplaced for elevated freeway construction. In such cases, it is normal to allow the soil embankments to remain undisturbed for 12 to 24 months while consolidation and strength increase occurs. The actual pavement or asphalt is placed after consolidation occurs and the cohesive strength of the embankment has increased. To state that the waste dumps will not also consolidate and increase in cohesive strength is not only grossly conservative, but also completely incorrect. A further example of the increase in cohesive strength with consolidation over the long-term is the "desert alluvium" that is found in southern Arizona open pit copper mines. Originally, the alluvial material was accumulated by water into the desert areas from the surrounding mountains. Thousands of years later the desert alluvium has been mined to reach copper ore several hundreds of feet below the desert ground surface. Commonly, the desert alluvium has been personally observed to be stable at slope angles of 90° over heights up to 100 feet. The oldest mine having such slope angles and slope heights is approximately 20 years old. Arizona desert thunderstorms commonly drench these alluvial materials many times each year. However, to date most of these cut slopes have remained quite stable. The major reason for their stability is the high

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(Cont.) cohesive strength that has resulted as long-term consolidation has occurred.

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The situation in FD-2 Dump is very different than that in any of the other waste dumps. FD-2 Dump was originally placed on a sloping hillside. Some time during the past several years failure has taken place in the dump. The actual location of the failure plane is unknown except for the entrance and exit of the plane of movement on the crest and in the toe. Analysis of the dump indicates that the failure plane vertically enters the dump about 30 feet behind the crest. It is presumed to pass vertically downward to the interface of the dump materials and natural hillside strata. The failure plane may either pass along that interface or it may be located inside the natural hillside strata, which are known to consist, in part, of weak shales. The failure plane then daylights the slope just below the dump toe in the natural hillside materials. In any event, the failure plane presumably passed along the path of least resistance. As the dump now stands, it is stable, but only just stable. It should, however, remain stable unless some outside force acts on it. Only an earthquake or pressurization from groundwater could act as such an outside force. The probability of either of these events is considered extremely small. If either did occur in such magnitude that the dump was impacted, the dump would probably just slide downward until it again

10-66(Cont.) reached a point of equilibrium. Only in the event of a very rapid pressurization from a deluge of water or a major earthquake would the dump catastrophically fail. The consequences of catastrophic failure in the worst case would be minimal because the dump would simply displace outward from the toe 50 to 100 feet. Nothing, except the natural topography, is located immediately beneath the present toe.

PREPARED COMMENTS FOR PUBLIC HEARING

Warren R. Keammerer, Ph.D.

My name is Warren Keammerer. I have a Bachelor of Science in Biology and a Ph.D. in botany and plant ecology. For the past 13 years I have been working as a consultant in vegetation science and plant ecology. Specifically my work consists of design and evaluation of reclamation plans, evaluation of revegetation success on mined lands, and collection of baseline data for use in preparation of mining permits and impact statements. I am currently working as a consultant to Anaconda Minerals with the specific tasks of reviewing and redesigning portions of Anaconda's revegetation plan, evaluating monitoring programs and proposals, and evaluating certain aspects of post-mining land use capabilities.

After having read and evaluated the draft DEIS, I have the following comments on revegetation success criteria, livestock carrying capacity on reclaimed areas, the use of phreatophytes to control groundwater levels, the use of the Community Structure Analysis method for evaluation of revegetation success, vegetation characteristics of the reclaimed pits, and comparison of the no action alternative with the Anaconda proposal.

Revegetation Success Criteria

The three proposals in the draft DEIS contain three apparently different standards for evaluating revegetation success. The Anaconda proposal sets the standard at obtaining 70 percent of the cover and production of the surrounding native vegetation evaluated after three growing seasons. The Department of Interior (DOI) proposal sets the standard at obtaining 90 percent of the surrounding native vegetation after 5 years, and the Laguna Pueblo proposal sets the standard at obtaining 90 percent of the surrounding vegetation after 10 years. On first examination these standards appear to be quite different. In actuality, the standards are really quite similar because they represent various points on a successful revegetation trend curve.

10-67 Data collected from the already reclaimed areas at the Jackpile-Paguate site suggest that if stands of vegetation on reclaimed sites reach 70 percent of the surrounding native vegetation cover and production, there is a high probability that the established plants will continue to grow and increase in cover and production. This is especially true for shrub species. Existing data also suggest that if the 70 percent level is not reached after three years, then some sort of management will be required to improve areas of this type.

In most cases a 70 percent level after 3 years is indicative of successful establishment. Of the 9 different groups or areas (17 dump sites) that have been reclaimed on the Jackpile-Paguate site, 6 have exceeded 70 percent of the surrounding native vegetation. Of these six, four have exceeded 85 percent, and of these, 3 have exceeded 90 percent. Of the three that had not exceeded 70 percent

when the evaluation program ended, two were showing strong positive trends. Only one of the nine areas was not doing well, and the fact that it was not doing well was clearly apparent prior to the end of the third growing season. This area is one that will need to be retreated once complete reclamation of the site begins.

Observations will be conducted throughout the entire reclamation process and remedial action will be taken as early as possible to assure revegetation success. If the 70 percent level is reached after 3 years, then with continued plant community development it is likely that cover and production will attain 90 percent levels over time. The 3 year/70 percent, 5 year/90 percent and 10 year/90 percent standards represent points on curves of revegetation success. On very successful sites, the 90 percent level may be reached by the third year. On other sites that are successful, the 90 percent level may not be reached until year 5 or later.

10-67(Cont.) One concern related to tracking the success of revegetation for only three years is that success during this time may be related to a favorable precipitation cycle. That is, the revegetation may have taken place during above normal precipitation years. Data from the Rio Puerco Watershed located nearby, suggest that in this part of New Mexico, the dry-wet precipitation cycles occur every 3-4 years. With this type of cycle, it is likely that all of the reclaimed areas will have undergone at least one precipitation cycle when the formal success evaluation is conducted. Some of the areas that have already been reclaimed will have gone through three cycles. The three year monitoring period appears to be long enough to evaluate the resiliency of the reclaimed areas relative the precipitation cycles.

Another important aspect of the 3 year/70 percent criterion is that most of the reclaimed areas will be older than three years when the formal evaluation is prepared. Some of these areas will be as much as 10 years old. Evaluation of these older areas will provide data for and insight into the changes in cover and production that occur as the reclaimed areas become older.

In terms of establishing an acceptable standard for revegetation success, it appears that the 3 year/70 percent level is adequate.

Livestock Carrying Capacity On Reclaimed Areas

10-68 One of the important concerns of any reclamation project is determining whether the revegetation plan will support the defined post-mining land use. At the Jackpile-Paguate site, the reclaimed areas will be used for grazing by domestic livestock and will also provide wildlife habitat. When the disturbed areas are successfully reclaimed, these land uses should be supported without any specific management programs other than those associated with a prudent grazing management plan. For the purposes of livestock grazing on the site, it would be a good idea to wait until the reclaimed

communities have stabilized before livestock are grazed on the site. The recommendation is that the communities should be allowed to attain higher levels of cover and production before a grazing program is implemented.

In order to evaluate the capabilities of the reclaimed lands to produce suitable livestock forage, productivity data from 1981 were used as the best available information regarding the productivity of the areas that had already been reclaimed as well as providing data for the native surrounding vegetation. Evaluations were based on herbaceous production only, since no shrub data were available. Inclusion of shrub production data would have increased the estimates of total carrying capacity.

In order to conduct the carrying capacity analysis, it was first necessary to obtain an estimate of the extent of the defined landscape units within the reclaimed areas. Rough estimates adequate for estimating carrying capacity were derived from the reclaimed slope configuration map (Anaconda 1982).

10-68(Cont.) Estimates of carrying capacity for the reclaimed areas were based on total production data from Dumps S and J. Mean production for these areas was 711 pounds per acre. This value was used as the best available estimate of production for flat upland and bottomland reclaimed areas. Half of this value (355 pounds per acre) was used as the best available estimate for reclaimed side slopes. These values were multiplied by the estimated areal extent of uplands, bottomlands, and side slopes to determine the total production for the site once reclamation is complete. Based on these calculations, the mean production for the reclaimed site would be 638 pounds per acre. Assuming 40 percent utilization by domestic livestock, the reclaimed areas would have a carrying capacity of 17 animal unit months (AUM) per month (an annual total of 204 animal units). This is equivalent to 3.1 acres per AUM.

A similar approach was used to determine carrying capacity for the surrounding native vegetation. Total production for uplands was based on data from Gavilan Mesa (557 pounds per acre). Total production for bottomlands was based on data from an alluvial area along the Rio Paguete (693 pounds per acre). Total production for side slopes was based on data from Basket Mesa (489 pounds per acre). These data were used in conjunction with estimates of the extent of uplands, bottomlands, and side slopes to determine total production on the surrounding native areas. Based on these calculations, total production on the surrounding native areas was 586 pounds per acre. Assuming 40 percent utilization by livestock, the native areas would have a carrying capacity of 15.6 animal unit months per month (an annual total of 187.5 animal units). This is equivalent to 3.4 acres per AUM.

It is interesting to note that the projected total carrying capacity of the reclaimed areas is greater than that for the native reclaimed areas. The above analyses suggest that with existing revegetation technology the Jackpile-Paguete site can be reclaimed

10-68
(Cont.)

to a level that will support the defined post-mining land use.

Use of Phreatophytes to Control Groundwater Levels

Anaconda's 1982 reclamation proposal calls for backfilling the excavated pits to a level that would be above the anticipated recovery of the ground water table. An alternative to this approach is presented in Anaconda's 1985 Multiple Land Use Reclamation Plan.

The alternative to backfilling above the projected ground water recovery level would be to backfill to eight feet above the existing water levels in the ponds. These backfilled areas would then be planted with phreatophytic species. The total consumptive use by the phreatophytes will be great enough to dissipate ground and surface water that would come into the pit. Water budgets based on ground water inflow, surface runoff and phreatophytic consumptive use have been developed. These water budgets are based on extensive ground and surface water data and show that it is feasible to control water levels with phreatophytic species. The total amount of water to be consumed would be 16 acre-feet for the Jackpile Pit, 24 acre-feet for the South Paguate Pit, and 53 acre-feet for the North Paguate Pit. Consuming this much water would require planting 6.4 acres of phreatophytes in the backfilled bottom of the Jackpile pit, 9.6 acres in the South Paguate pit and 21.1 acres in the North Paguate pit. The primary phreatophytic species to be used in this plan would be saltcedar (*Tamarix pentandra*). The existing water quality in the ponds is well within the tolerance of saltcedar.

This alternative reclamation plant represents an innovative solution to the problem of returning the excavated pits at the Jackpile-Paguate site to a productive and self-sustaining use. The reclaimed areas can be used by wildlife as well as providing sheltering areas for domestic livestock.

Use of the Community Structure Analysis Method for Evaluation of Revegetation Success

One of the key factors associated with evaluation of reclamation at the Jackpile-Paguate site is the selection of revegetation evaluation methods and identification of monitoring parameters. The Anaconda proposals (1982, 1985) state that basal cover and total production will be used as evaluation parameters, and that the data will be collected using established methods. The Department of Interior (DOI) and Laguna Pueblo proposals call for use of an approach called the Community Structure Analysis (CSA) method. This method requires collection of canopy cover, frequency, and density data.

10-69

While the development of the CSA method is credited to Pase (1980), it is important to note that the basic principles of the approach were developed in the plant ecology laboratory at the University of Wisconsin by John Curtis in the late 1940's and early 1950's (Curtis 1959). The CSA method is based on calculating a synthetic index (Importance Value) of relative importance for each species encountered in a plant community or range site, which is computed by summing normalized cover, frequency and density data.

The use of the CSA method is based on repeated sampling of the same transects located on rangelands in the Southwest. Changes in the importance value for species encountered on these rangeland sites are then attributed to changes in range condition, since the premise is that the importance value is relatively un-affected by changes in environmental factors such as precipitation (Pase 1980). Trends in importance value are considered to be very strongly related to actual vegetation changes associated with grazing influences. It is of interest to note that the CSA method has apparently been used only on native vegetation. This is important, since these native communities have had hundreds, even thousands of years in which to attain high levels of internal stability.

While the use of the CSA method for evaluating the condition of native rangelands may be a valid useful technique, it does not appear to be appropriate for use on the Jackpile-Paguate Site.

10-69(Cont.) The CSA approach was developed for use on established rangelands where changes in community structure and composition may be related to changes in range condition due to grazing. On the reclaimed areas on the Jackpile-Paguate site vegetation changes may be related to a variety of factors. It is important to remember that the communities developing on the Jackpile-Paguate reclaimed areas will be under going successional changes that will continue until stable communities develop. During this time importance values are likely to change dramatically in response to competition among the seeded and colonizing species. The reclaimed areas will be different from the native communities in a variety of ways. The species composition will be similar, but there will be fewer species on the reclaimed areas. The soils on the reclaimed areas will be very different from the soils on the surrounding areas. Also, the reclaimed areas will be fertilized at the time of planting. Because of the differences between the native vegetation and the reclaimed areas, there is no certainty that importance values from the reclaimed areas will respond in the same way as the importance values from native vegetation types. For example, species growing on reclaimed areas may tend to fluctuate dramatically in response to precipitation because the sites may have been fertilized, or because the soils on reclaimed areas may be more porous, or because of plant competition in a system with reduced species diversity. Any or all of these factors could cause yearly changes in species importance values.

If the relative importance value of a species (as measured by importance value) is to be used as a monitoring "parameter", then it is important to understand the factors that can influence it. First, the relative importance of a species can decline even if cover, frequency, and density increase. In a situation like this, attributing a decrease in importance value to a change in range condition would be incorrect.

Second, large annual changes in importance value may be associated with species that are especially sensitive to annual

differences in precipitation. In the arid southwest, annual species are much more prevalent in above normal precipitation years than they are in dry years. In order to alleviate the problems associated with annuals, they should not be included in the CSA analyses. Elimination of annual species data from native rangelands may be justifiable, but it is not appropriate to disregard data for these species in analyses of revegetation success on reclaimed lands. Annuals can form an integral component of vegetation on reclaimed lands especially during the first year of vegetation establishment, and their presence may not be totally detrimental. Annuals can provide substantial amounts of cover during the first growing season following seeding and can help to reduce soil erosion.

10-69(Cont.) In the published information regarding the CSA method, there is nothing to suggest that importance value is a better indicator of revegetation success than are canopy cover, basal cover or biomass production. According to the DEIS, the CSA method provides several advantages: 1) measurements can be repeated with measurable consistency, 2) sampling error can be computed and reliability can be evaluated, and 3) the quantitative data can be readily tested by conventional statistical methods. All three of these advantages are also true for productivity data. No matter what methods of data collection are used, cover data are influenced by differences in observers. they are not, however, subject to the problems associated with indices based on normalized data. For the purposes of evaluating cover under the Anaconda proposal, differences related to different observers should not be a problem since comparisons will be made between reclaimed and native areas during a single growing season. It is likely that the cover data for these years will be obtained by the same observer. Cover data can also be evaluated using conventional statistical methods, and in fact cover data are statistically evaluated for determination of revegetation success on reclaimed coal lands.

In spite of the problems associated with the use of the CSA method for evaluating revegetation success, it may be totally appropriate to use this method once the revegetation is complete and has been judged to be successful. Once a grazing management program for the site has been developed, the CSA method could be used to monitor vegetation change under the influence of livestock grazing. Also, the CSA method could be used to develop optimum grazing strategies for the reclaimed areas.

Comments Related To The DEIS Discussion Regarding Development Of Salt Playas In The Reclaimed Pit Bottoms

10-70 In the draft DEIS the statement is made that with the 1982 Anaconda Proposal the reclaimed pit bottoms "...would be saline and unfit for use..." resulting from periodic, temporary ponding of runoff water (Page 3-30). The total area projected to be affected is estimated to be approximately 200 acres (Page 3-30). These conclusions are based on information included in the 1983 Dames and

Moore hydrology report.

10-70(Cont.) Examination of the Dames and Moore Report, however does not support these conclusions. The information in the Dames and Moore report pertaining to periodic, temporary flooding is based on a predictive model that was run in a very conservative mode. That is, it presents a worst case scenario. The model also does not consider that revegetation options exist that can greatly reduce the likelihood of the pit bottoms becoming unproductive salt playas. Also, data in the Dames and Moore report suggest that a considerable amount of ground water will be moving through the pits once an equilibrium state is reached. In fact the amount of water moving through the pits, on the average, is approximately 9 percent of the total volume per year. This would give a retention time of approximately 11 years for materials in the groundwater in the pit areas. This amount of flushing would serve to prevent the longterm accumulation of salts that would create the saline conditions mentioned in the DEIS.

In addition to the flushing action, there are other alternatives that can prevent these areas from becoming "unproductive". These areas can be planted with phreatophytic vegetation that can provide suitable wildlife habitat. The pit bottom areas could be planted with saltcedar (Tamarix pentandra), inland saltgrass (Distichlis stricta), and alkali sacaton (Sporobolus airoides) in order to control possible rises in the water table and also consume any runoff as well.

The projected water quality within the reclaimed pit areas is within the tolerances of saltcedar. Saltcedar can tolerate and grow under conditions of electrical conductivity that are twice as large as those at the Jackpile-Paguete site.

It is also important to note that relative to the reclamation of the open pits, the 1982 Green Book Anaconda proposal presented in the DEIS constitutes a revegetation plan that is significantly better than the no action alternative. The way the discussion regarding the development of salt playas is presented in the DEIS, it seems that the Anaconda proposal is really no better than the no action alternative. This is not the case.

Comparison of the No Action Alternative with the 1985 Multiple Land Use Reclamation Plan

With Anaconda's proposal, grading, backfilling and topsoiling of disturbed areas would produce suitable sites for plant growth and development. Data from areas that have already been reclaimed using the techniques proposed in Anaconda's reclamation plan show that plant communities can be created that have cover and production values comparable to the surrounding native vegetation. The composition on the reclaimed areas consists of species that are desirable for livestock grazing and are supportive of the proposed post-reclamation land use. With the Anaconda proposal, the level of

reclamation effort and projected success is comparable to that can be expected with either the DOI or Laguna Pueblo proposals.

STATEMENT OF
DR. KENNETH LUDEKE

July 26, 1985

LUDEKE STATEMENT
July 26, 1985

My name is Kenneth Ludeke and I am President of Ludeke Corporation, an environmental consulting firm that deals mainly with the coordination of environmental permitting for major industrial organizations. I received a Ph.D. in 1976 with a major in Agronomy and Plant Genetics, a M.S. degree in Agronomy in 1973, and a B.S. in Agronomy in 1968--all from the University of Arizona. My research focused on agronomic applications in the stabilization of copper mine disposal slopes, reclamation of disturbed areas, and chemical and physical investigations of industrial soil wastes.

I have served as chairman of the open-pit mining session for the National Academy of Sciences Commission on Surface Mining and Reclamation. I am fully aware of environmental quality standards set forth by the Surface Mine Reclamation Act. I was appointed to the National Petroleum Council, Synfuels Task Force Group to provide advisory services for review of the Department of Energy (DOE) on all matters relating to petroleum industry environmental matters.

I have been directly involved in the methodology of applied research supporting rangeland revegetation planning and soil stabilization for Anaconda's Jackpile-Paguate Mine near Grants, New Mexico.

The goals established by Anaconda Minerals Company for its revegetation program are to (1) provide soil stabilization for disturbed land features, (2) create a grazing resource for domestic livestock, habitat and forage for indigenous wildlife and, (3) produce an aesthetically acceptable landscape. Anaconda has shown that a self-sustaining stable plant community can be established in the semi-arid climate and disturbed soil conditions existing at the Jackpile-Paguate Mine. The company

proposes to establish similar long-lived vegetation communities at the mine that satisfy the revegetation goals and that are achievable under the environmental conditions existing in West Central New Mexico.

The revegetation practices and techniques proposed in Anaconda's 1985 Multiple Land Use Reclamation Plan are based upon the successful results of the revegetation program already completed at the mine and practices which have been proven successful in similar projects in the Southwestern United States. These reclamation techniques have been derived from my recommendations and the professional recommendations of other consultants and government agencies relative to rangeland revegetation planning and soil stabilization, and the experience of Anaconda's own reclamation specialists.

In order to promote optimum vegetal germination and growth, and allow for efficient rangeland use, land forms will be graded to more gentle slopes and topdressed with a suitable topsoil for enhanced plant growth. The disturbed waste piles and backfill will be conditioned by topdressing with a minimum of 12" of topsoil like material. The growth media consists of Tres Hermanos sandstone or alluvial material that has tested suitable for plants from chemical and physical laboratory evaluations. The Tres Hermanos sandstone has also been proven an excellent soil for plant growth material from data collected from actual successful vegetation stands. This topsoil material has been stockpiled for future topdressing usage. Following placement of the topsoil the seedbed is prepared by discing or land imprinting and fertilized.

Anaconda has selected plant species, seeding rates and seed ratios that will more than adequately satisfy the revegetation goals. The plant characteristics selected for were drought tolerance, season of

growth, temperature tolerance, salinity tolerance, soil texture adaptation, vigor, reproductive capability, rate of establishment, longevity and mixture compatibility. The stabilization aspect of the selected plant species provide root systems that offer excellent soil binding properties and also substantial plant canopy that protects the reclaimed ground surface from raindrop impact that dislodge soil particles. The seed mixture contains plants that will establish a balanced vegetal community for both grazing and browsing animals. The majority of the grasses and all of the shrub species are native to the mine area. These species are well suited to revegetation at the mine due to their inherent ability to survive and propagate under the specific climate and edaphic stresses of the area. Seeding will be accomplished by drilling methods. Where seed is broadcast into areas inaccessible by drills the application rates will be doubled. All seeded areas will be mulched to aid in plant establishment and to minimize erosion.

Anaconda's previously revegetated area encompasses 17 waste dump sites totalling approximately 485 acres. The plant communities evaluated on the reclaimed waste piles are in various stages of vegetation development. The monitoring data collected on reclaimed piles at the Jackpile-Paguate Mine indicates that the vast majority of the reclaimed sites have equaled or exceeded 70% of the plant cover and density found on control or reference sites on nearby rangeland after 3 growing seasons. The monitoring data also shows that these reclaimed sites achieve 85 to 90% of the plant cover and density found on reference areas within 4 to 5 growing seasons following seeding.

Those few reclaimed areas that have not progressed in an adequate manner or not achieved the 70% comparative value have received remedial

action to improve plant development. When remedial action is taken as soon as problems are identified, the reclaimed areas progress to the 70% comparison point within several growing seasons should precipitation be adequate. The remedial action may include reseeding, additional cultural treatments or re-topsoiling.

I have personally inspected Anaconda's reclaimed areas and have conducted ocular plant cover and production estimates and observed plant development. The vegetal communities seeded by Anaconda can withstand the harsh environmental conditions and have displayed a positive direction of change by increased cover and herbage production of grasses, shrubs and forbs. The cover and density of the revegetated areas are successful and within the character of nearby similar rangeplant communities. In fact, many of the revegetated sites exceed canopy cover and biomass found on natural rangeland in the area. The plant individuals on the reclaimed areas possess healthy root material, excellent plant height, leaf size and seed stalk production.

Plant cover and density trend curves assembled from success evaluation data collected on the reclaimed areas clearly indicate that sites achieving 70% of reference areas have not experienced retrogression over time. Visual examination of these reclaimed areas explicitly verifies this finding. Soils are stabilized, reducing water and wind erosion and ecological cycling of nutrients appears to be in progress.

The 70% point of success comparison on reclaimed sites to undisturbed rangeland is a sub-climax stage in the plant successional complex. This stage is characterized by perennial grasses with some perennial forbs and shrubs with few annual forbs present. This point is generally achieved in 3 growing seasons at the Jackpile mine. Sites reclaimed with 4 or more years

since seeding appear to be at a stage near or at climax with more dense stands of deep-rooted grasses and shrubs but not many forbs species present. The near climax areas have progressed past the 70% comparison point.

Gradually, over a longer period of time, soil fertility will improve and support a large number of plant species increasing past the 70 percent (sub-climax) stage of succession to a more stable climax type vegetation. Once the disturbed areas are at 70% or more stage of vegetative development, they should not require further treatment as the vegetation will increase in density, there will be improving soil fertility, and there will be more soil micro-organisms present in the soil to aid and enhance further plant community proliferation.

The collected data and my observation reflect excellent vegetal cover and plant production, plant stand densities and overall stable plant communities where the 70% stage is reached. Plant communities attaining the 70% comparability value are stable and will progress to higher stages of plant succession over time assuming the environmental conditions typical of the Jackpile-Paguate area.

STATEMENT OF LARRY T. MURDOCK

Personnel

I am Larry Murdock, a Partner with Dames & Moore, consultants in the environmental and applied earth sciences. I have directed several detailed studies of the hydrology of the Jackpile-Paguete Mine site aimed at determining the long-term ground water levels below the pits, the degree of ponding which may occur in the pits, and water quality impacts of the reclamation plan. We have also reviewed erosion control aspects of Anaconda's reclamation plan.

I am a geotechnical engineer with a Bachelor of Science degree in civil engineering from the University of Utah. I have been with Dames & Moore for over 23 years, during which time I have performed and have managed numerous complex hydrology, geotechnical, environmental and reclamation investigations for the mining industry. I am a registered Professional Engineer in New Mexico and a number of other states.

Other principal personnel involved in our studies for the Jackpile Mine include George Condrat, Pierre-Jean Pralong, Stan Plaisier, and Anand Prakash. George Condrat was principal investigator for the ground water studies. He holds a Bachelor of Science degree in mining engineering from the University of Utah and a Professional Degree in geological engineering from the Colorado School of Mines, and is a registered Professional Engineer in New Mexico. He has been involved in numerous hydrologic evaluations in his 13 years with Dames & Moore. Pierre-Jean Pralong, a computer specialist, performed the numerical simulations for the ground water hydrology model. He is a graduate in engineering of the Federal Institute of Technology, Zurich, Switzerland, and is responsible for the development, validation, and documentation of the TARGET ground water model computer code. Stan Plaisier conducted stochastic surface water modeling of pit areas. He is a registered Professional Engineer and holds B.S. and M.S. degrees in civil engineering from the University of Michigan. Anand Prakash is our Chief Water Resources Engineer. He is a registered Professional Engineer with B.S. and M.S. degrees from the University of Roorkee, India, and a Ph.D. in civil engineering from Colorado State University. Dr. Prakash has reviewed Anaconda's erosion control plan for the Jackpile-Paguete Mine.

DAMES & MOORE

Reclamation

My discussion will address principally Anaconda's multiple use reclamation plan, although I will also comment on the comparative effects of several alternatives. Anaconda's proposed plan has been discussed in detail previously by others. Briefly, Anaconda's present reclamation plan includes the following features:

1. Ore and pretore piles will be left at their present locations, graded to slopes no steeper than 3 horizontal to 1 vertical, contour furrowed or land imprinted, and revegetated.
2. Waste dump slopes that are located within closed drainage basins will not be reduced, but will remain at angle of repose, and will not be topsoiled. Dump slopes having potential of eroding and contributing sediment into water courses will be graded to slopes of 3H:1V, topsoiled, contour furrowed or land imprinted, and revegetated. All dumps within 50 feet of the Rio Paguete and Rio Moquino will be removed.
3. The South Paguete and Jackpile pits will be backfilled only to the extent necessary to minimize free water ponds resulting from ground water inflow. Phreatophytes will be encouraged so that they may discharge surface and ground water from the pit bottom areas.
4. A storage reservoir will be developed in the North Paguete pit by diverting stream flow from the Rio Paguete into the pits impounding about 930 acre-feet of water, and discharging the stream from the east end of the pit back to the Rio Paguete.

I will address the impacts of Anaconda's proposed plan and other alternatives with respect to the following:

1. Long-term ground water levels.
2. Discharge rates of ground water to pit bottom areas.
3. Ground and surface water losses by evapotranspiration and evaporation.

4. The potential for ponding of ground and surface water in pit bottoms.
5. Potential salinity buildup on pit bottom areas due to ground and surface water inflow.

I will also comment on erosion aspects of the plan.

Work Performed

Our studies have been extensive and have included field work, laboratory testing of soils and water, engineering and environmental evaluations, and computer modeling of ground water and surface water flows in the mine vicinity. We prepared the first reclamation plan for the mine. Our field work at the mine involved the drilling of 5 monitor wells and 10 borings in and around the pits to evaluate the permeability and backfill characteristics, ground water levels, and water quality. Pumping tests and slug injection tests were conducted to evaluate the permeability of the backfill. Bulk soil samples and undisturbed soil and rock samples were taken to measure their physical properties including permeability, infiltration capacity, grain-size and engineering classification. Soil samples were also tested in the laboratory to determine geochemical characteristics including mineralogy, acid-base potential, sulfide content, and soil capacity for neutralization, leaching, and attenuation of contaminants. We also studied old mining records of the Anaconda Company to establish pre-mining water levels, and have evaluated hydrologic tests conducted by Hydro-Search and the U.S. Geological Survey.

We then analyzed and compiled the results of the data collection, devised model cases, and conducted model calculations by running a computer program that accounts for ground water flow and contaminant transport. We also have evaluated in detail the potential for ponding and salt buildup within the pit areas using water balance calculations. In a water balance, all components of water flows such as ground water seepage, runoff, evaporation, etc. are esti-

mated or calculated. Calculations were made for average future conditions (steady-state evaluations). Also, simulations of future (transient) conditions were made using a probabilistic selection of precipitation on a monthly basis for 100 years. This latter approach allows estimation of the degree of fluctuation of the extent of ponding. Water quality can be assigned to the various flow components allowing estimation of salt buildup.

We have also reviewed the stability and erosion potential of the waste dump slopes proposed in Anaconda's reclamation plan. This review is based on literature search and parametric analyses of the rates of erosion and gully-head advancement of erodible soils.

Ground Water Modeling

Our studies have led us to a number of interesting conclusions. First off, we have reconstructed the pre-mining ground water table in the region. This was done by assembling all known physical properties of the hydrologic system into a ground water computer model. The model was then calibrated to actual ground water levels measured during mineral exploration in the late 1950's and early 1960's. The model was then verified by simulating and matching recent ground water levels which have been affected by mine dewatering operations. Then, predictions of long-term future water levels were made assuming backfilling of the pits. These evaluations were presented in our March 23, 1983, report.

Subsequently we performed hydrologic evaluations to estimate the potential for ephemeral ponding and to assess impacts under Anaconda's Multiple Use Reclamation Plan. Average long-term conditions were estimated through use of a water balance for each of the pits. The basis of a water balance is the principle of conservation of mass; that is, water inflow to a unit must equal outflow plus storage increase. Under steady-state conditions, all components

are at equilibrium and, therefore, storage changes are zero. For a pond in the bottom of a pit, ground water inflow plus runoff to the pond plus direct precipitation on the pond must equal evaporation from the pond plus ground water outflow from the pond plus evapotranspiration by (phreatophytic) vegetation around the periphery of the pond plus increases in water stored in the pond.

We estimated ground water inflow rates under reclaimed conditions through numerical modeling using the data base shown in our 1983 report. Knowing that the Jackpile and South Paguate pits are to be reclaimed to approximately their current topography, ground water levels will be about the same as the current levels. Ground water modeling indicated that ground water inflows under these conditions would be 7 acre-feet per year and 18 acre-feet per year, respectively, for the Jackpile and South Paguate pits. These inflow rates are quite small and could easily be discharged by phreatophytes. For example, 3 to 7 acres of phreatophytes could discharge this amount of inflow. With phreatophytes, ground water should not pond. Ground water levels would be about the same as those measured now. Ground water flow would be entirely into the pit bottom areas because of the low elevation of the pits with respect to natural ground water conditions. Therefore, a long-term buildup in salinity of ground water under the pit bottom areas should be expected.

Of course, there will be no ephemeral ponding or salt buildup in the North Paguate pit because the Rio Paguate is to be diverted through the pit and stream outflow will be established. At present there is some 50 to 100 acre-feet per year of seepage into the west side of the North Paguate pit through backfill from river alluvium. With filling of a reservoir in the pit this seepage rate would be on the order of 10 acre-feet per year. About the same rate of flow would occur out of the east side of the pit.

Surface Water Modeling

Using the modeled ground water inflow rates and the measured pond level changes from November 1983 to November 1984, estimates of surface water runoff to the ponds can be made for current conditions. These estimates indicate that runoff under current conditions is 6 to 16 times greater than that which we estimate will occur under reclaimed conditions. Thus, reclamation will have a large effect on the extent of ponding. Based upon average conditions, we estimate an average pond size of 3 acres for the Jackpile pit and 1.5 acres for the South Paguete pit due only to surface water runoff and assuming conservatively that phreatophytes discharge all ground water and none of the runoff. These pond areas are average sizes. Since runoff would occur intermittently, being due to intense precipitation events of infrequent occurrence, pond levels would vary seasonally and with the time since the last major runoff event. Ponds might dry up completely depending upon the elevation-area relationship of the pit bottom area. If large flat areas were constructed on the bottom of the pits, runoff would pond over larger areas and would evaporate by solar radiation more quickly. If smaller steeper areas are left, pond levels would vary more, while pond area would vary less than with large flat bottom pits. Large flat-bottom pits have greater potential for development of playa-type conditions, whereas smaller steeper pit bottoms have greater potential for long-term or permanent ponding. Anaconda has selected a design that will limit the extent of ponding and reduce the potential for development of playa-like conditions.

For the estimates of surface water runoff in the long-term, it was assumed for worst-case conditions that water spreading berms would not retain runoff flow and that the entire internally-drained tributary area of the pits would run off to the pit bottom, if the magnitude of precipitation is large enough to produce runoff. Runoff would occur to several sub-areas within a pit, such

as in the Jackpile pit in which several small ephemeral ponds will develop rather than one larger one. In the shorter-term, water spreading berms, designed to retain the 100-year runoff, will effectively reduce runoff, will promote water harvesting by vegetation and will reduce ephemeral ponding. Under future reclaimed conditions where water-spreading berms will effectively retain the 100-year runoff, the total average extent of ponding in the South Paguate and Jackpile pits is estimated to be less than one acre due to runoff. Under long-term conditions if all berms are breached, the total average extent of ponding is 5 acres due to surface runoff only. Since ground water will flow into the pit bottom areas it may also contribute to ponding if it is not discharged by phreatophytes.

Salts carried by runoff and ground water will accumulate in playas or ponds in the bottoms of internally drained pits. These will be concentrated and will precipitate as ponds dry up; and will be diluted as a pond rises in response to a major runoff event. Salts will build up in ponds and in ground water in close proximity to the ponds or playas at the lowest parts of the pits. Salinity build-up will be greatest in the northern Jackpile since ground water quality is quite poor and is a large percentage of the water inflow. We estimate that total dissolved solids in the average size pond in the northern Jackpile will exceed 10,000 parts per million within 10 years. Ground water around the periphery of the pond would also increase in TDS and phreatophyte vegetation would become less hardy. Eventually, the pond area would become quite saline, loss of phreatophytes would increase ground water discharge to the pond, and pond extent would increase to an average size of 4 to 5 acres.

In contrast to the northern Jackpile, much smaller amounts of salt would be deposited in the southern part of the Jackpile pit because little ground water would discharge. Pond volumes are smaller, however, resulting in average concentrations of about one-third those in the northern Jackpile pond.

Water quality in the South Pagate pit is expected to be much better than in the Jackpile because ground water is of a higher quality. TDS are expected to be below 5,000 parts per million for 40 years.

The predominant constituents in the saline water are sodium and sulfate. Pounded waters in the northern Jackpile and South Pagate pits will eventually be unsuitable for most uses and some 15 acres of land will become unproductive. While the ponded areas will no longer support phreatophytes, phreatophytic or similar vegetation will continue to surround the ponds. Fifteen acres is a relatively small amount of land, about one percent of the internally drained pit areas, and represents five animal unit months which is less than the amount of land necessary to support a single head of cattle for grazing.

Salts which build up in the eventual Jackpile and South Pagate ponds due to inflow from runoff and from ground water which has leached backfill will not flow to and contribute to the salinity of the Rio Pagate, as would be the case with options that restore natural ground water flow to the river system. Development of a water storage reservoir in the North Pagate pit will provide a significant stockwatering and irrigation resource. Water quality of the reservoir is expected to achieve a total dissolved solids concentration of 900 ppm within 5 years.

Erosion Control

The basic elements of the Multiple Use Reclamation Plan include stabilization of landforms, clearing active waterways of waste material, erosion control, and revegetation.

Anaconda's plan calls for isolated protore piles to be consolidated into nearby larger piles and stabilized. The exterior slopes of protore piles will

be graded to 3H:1V and all the surfaces of the piles will be covered with 12 inches of topsoil to facilitate revegetation. All sloping areas will be contour-furrowed or land-imprinted. These measures will minimize the potential for erosion of the prototype piles due to overland flow.

Sideslopes of ore-associated waste dumps will be reduced to 3H:1V and the entire dump surface will be topsoiled with 12-to-18 inches of cover. Overburden dump slopes that have a significant potential for erosion and may contribute substantial sediment loads to existing watercourses will also be graded to 3H:1V and covered with 12-to-18 inches of topsoil material. Overburden dump slopes draining into closed water basins will remain at their present geometry. Soil erosion from these dump slopes will be fully contained within the property. The top surfaces of all non-ore-associated waste dumps will have 12-to-18 inches of topsoil and contour-furrowed or land-imprinted on sloping terrains and vegetated with grasses and shrubs. These measures will minimize erosion and reduce the transport of sediment loads to the existing streams in the area.

The backfill slopes of the pits will be graded to 3H:1V. The pit walls will be scaled and trimmed back a distance of 10 feet at a slope of 3H:1V. Surface-water control berms will be provided within the pit drainage areas and large berms will be placed along the crests of pit highwalls. These measures will facilitate control and diversion of surface runoff, reduce the potential for erosion, and promote vegetation growth.

All Jackpile sandstone and overburden waste material will be removed to a distance of 50 feet from the centerline of the nearest stream. This will provide a reasonably wide unobstructed flood plain and minimize the potential for the entry of eroded materials into the respective streams. The slopes of dumps remaining outside the 50-foot removal area will be graded to 3H:1V. All disturbed dumps will be covered with 12-to-18 inches of topsoil and the

sloping terrains will be contour-furrowed or land-imprinted. All topsoiled surfaces and cleared streambed areas will be seeded with native grasses and shrubs.

We feel that this reclamation plan is reasonable and is based on standard erosion- and sediment-control practices. It should mitigate most of the environmental impacts associated with erosion, sedimentation, and surface-water runoff.

Comparison With Other Options

A summary comparison of the Multiple Use Reclamation Plan with other alternatives previously presented by the Department of Interior is presented on Table 1.

Under the No Action Alternative ground water levels and ground water discharge rates to the pit bottom areas would be about the same as they are now. Ponds would increase to an average extent of some 65 acres and would be unsuitable for irrigation and stockwatering due to high salinity. The amount of surface water runoff and ground water discharge lost to the Rio Paguete system would be about 91 acre-feet, equivalent to about 8 percent of the present mean flow of the Rio Paguete. While salts would build up in ponds in the pits, the potential for salts leached from backfill to enter the Rio Paguete would be small since ground water and surface runoff would be retained in the pits. Under the No Action Alternative, erosion and sedimentation in the affected area may continue at the current rate. There will be continued flood-induced erosion of the waste dumps located within the flood plains of Rio Paguete and Moquino and other ephemeral channels. Existing protore piles and waste dumps have potential for erosion due to overland flow. This erosion would continue and result in increased sediment loads in streams. The continued addition of waste material from these piles and waste dumps to the ambient sediment loads of streams would degrade surface water quality.

The Department of Interior (DOI) has proposed two options:

- o A Monitor Option
- o A Drainage Option

With few exceptions, waste dump slopes under these plans will be flattened to 3H:1V with no terracing. These designs are very similar to that proposed in Anaconda's 1985 Multiple Use Plan. While ground water would not pond under the Monitor Plan, temporary ponding of surface water runoff is inevitable and some minor salt buildup due to solar evaporation would be expected. Pondered runoff which seeps into the subsurface would recharge ground water but would also leach salts from backfill. Eventually soluble salts would discharge to the Rio Paguete through natural ground water flow.

Under the Drainage Option, the pit areas will be contoured and channeled to allow external drainage. Overland flow along the externally draining catchments will generate additional sediment which will result in increased sediment loads in streams. Recharge to ground water, and thus potential leaching of backfill would be less than under the Monitor Plan since no ponding would occur. However, salts which leach from backfill following restoration and natural ground water levels would eventually discharge to the Rio Paguete.

Concerning the potential for erosion and sedimentation inputs on streams, the Laguna proposal is nearly identical to the Department of Interior's Monitor Plan. Hydrologic effects would also be quite similar to the DOI Monitor Plan.

TABLE 1
SUMMARY OF LONG-TERM HYDROLOGIC IMPACTS

	Anaconda's Multiple Use Reclamation Plan	No Action Plan	DOI Monitor Plan	DOI Drainage Plan	Laguna Plan
Long-term ground water levels	Essentially same as those measured now in vicinity of Jackpile and South Paguate pits. Levels would be 20 to 40 feet higher north of North Paguate pit.	Essentially same as those measured now.	Essentially same as pre-mining levels. Near lowest level of backfill in pit bottoms. Levels 10 to 60 feet higher at one-half mile from pits.	Same as DOI Monitor Plan	Same as DOI Monitor Plan
Ground water discharge to pit bottom areas	Jackpile = 7 ac-ft/yr South Paguate = 18 ac-ft/yr North Paguate = <20 ac-ft/yr	Jackpile = 7 ac-ft/yr South Paguate = 18 ac-ft/yr North Paguate = 50 ac-ft/yr	None	None	None
Runoff lost to Rio Paguate due to internal drainage	Jackpile = 8 ac-ft/yr South Paguate = 5 ac-ft/yr North Paguate = none	Jackpile = 8 ac-ft/yr South Paguate = 5 ac-ft/yr North Paguate = 3 ac-ft/yr	Same as no action	None	Same as no action
Average extent of surface water ponding	Jackpile = 3 ac (5.5 ac) ^a South Paguate = 2 ac (8 ac) ^a North Paguate = 3/4 ac ^{aa} ^a without phreatophytes ^{aa} fresh water reservoir	Jackpile = 20 ac South Paguate = 19 ac North Paguate = 26 ac	Jackpile = 3 ac South Paguate = 2 ac North Paguate = 1 ac	None	Same as DOI Monitor
Salt loading	Salt would accumulate in pools or playas at bottom of Jackpile and South Paguate pits. Eventually 15 acres could become unproductive.	Salt would accumulate in pools in bottom of pits. Eventually 70 acres could become unproductive.	Salt would accumulate in pools or playas at bottom of pits. Eventually 6 acres could become unproductive	None	Same as DOI Monitor Plan
Ground Water Quality	Salts would buildup in ground water in upper several feet of soil below playas. Min- imal flow of ground water out of backfill to Rio Paguate.	Salts would buildup in pools in pits. Minimal flow of ground water out of backfill to Rio Paguate.	Small buildup of salts due to evaporation of surface water runoff. Ground water which leaches backfill will eventually discharge to Rio Paguate.	Reduced leaching of backfill be- cause of reduced infiltration of surface water com- pared to DOI Moni- tor Plan. Natural ground water leaching backfill eventually discharges to Rio Paguate.	Same as DOI Monitor Plan
Water Quality Impacts to Rio Paguate	Negligible impact due to ground water in pit backfill. Sedi- mentation reduced since 1,494 acres of disturbed land will not contribute to Rio Paguate.	Negligible impact due to ground water in pit back- fill. No sediment from internally drained pit areas. Erosion and sedi- mentation from remaining unreclaimed land.	Ground water in contact with backfill will even- tually discharge to Rio Paguate. No sediment from internally drained pit areas.	Ground water in contact with sch- fall will eventually discharge to Rio Paguate. Sediment from all reclaimed area will discharge to Rio Paguate.	Same as DOI Monitor Plan
Percent of pit drainage area potentially unproductive due to plays or saline ponds (livestock grazing units)	15/1494 = 1%	70/1494 = 5%	6/1494 = <1%	0%	6/1494 = <1%
Water Resource Development	Establishes water storage reservoir in North Paguate pit for livestock watering and irrigation.	None	None	None	None
Erosion Potential	Overall potential from dumps about same as DOI Monitor Plan. Water spreading berms will further reduce runoff, promote vegetation and re- duce erosion in pits. Pitcore could erode and flow into Rio Paguate if not re- mained for ore values.	Erosion will continue at present rates due to slow establishment of vegeta- tion. Potential for ero- sion of dumps in flood plains of rivers.	Similar to Anaconda's plan except sediment in pits would be greater because no water-spreading berms. Pitcore would be placed in pits and could not erode into Rio Paguate.	Erosion similar to Anaconda's plan ex- cept total sediment will be greater due to greater area of reclaimed land tribu- tary to Rio Paguate. Pitcore would be lo- cated in pit backfill and would not be avail- able to erode.	Same as DOI Monitor Plan



DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
HEALTH SERVICES ADMINISTRATION

Acoma-Canoncito-Laguna Indian Hospital
P.O. Box 130
San Fidel, New Mexico 87049

September 11, 1985

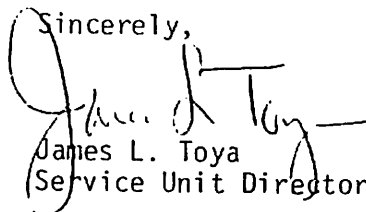
Mike Pool, EIS Team Leader
USDI - Bureau of Land Management
3550 Pan American Freeway, NE
P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool:

As the Director of the Acoma/Canoncito/Laguna Service Unit, I am submitting the following comments regarding the Jackpile - Paguate Uranium Mine Reclamation Draft EIS:

- 11-1
1. Although the EIS does not describe specific initiatives to provide for a long-term epidemiological study; this objective should be maintained;
 2. Since radiation can cause cancers and heritable defects, questions continue to arise from tribal members, regarding health affects now experienced, and the correlation with exposure to radiation. Public education must be planned to identify the relationships between disease and exposure to radiation;
 3. Due to the limited data available regarding related health problems, the ACL Service Unit proposes a basic screening program for uranium miners. This program can be implemented with the tribe as adequate resources become available.

I have attached a 1984 letter from the Director of IHS to then Governor Vicente Pedro. To my knowledge, the status as described remains the same. Included as part of this attachment is a report entitled "A Plan for Diagnosis and Prevention of Illness Related to Nuclear Resource Development on Indian Land."

Sincerely,

James L. Toya
Service Unit Director

Attachments

cc: Governor, Pueblo of Laguna
Director, Division of Patient Care Professional Services, IHS
Headquarters

U. S. Department of Labor

Mine Safety and Health Administration
4015 Wilson Boulevard
Arlington, Virginia 22203



September 17, 1985

Mr. Mike Pool
USDI - Bureau of Land Management
3550 Pan American Freeway NE
P.O. Box 6770
Albuquerque, New Mexico 87297-6770

Dear Mr. Pool:

The draft copy of the Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project dated February 1985 has been reviewed by the Mine Safety and Health Administration (MSHA) as requested. Although MSHA has no jurisdiction at the site due to cessation of mining in 1982, we are glad to evaluate the various proposals presented. The review was based primarily upon the safety aspects of the four alternative proposals rather than the environmental considerations.

The Department of Interior's (DOI) proposal (Monitor Option) is MSHA's selection for the most suitable alternative. The 3:1 slopes for the waste dumps are more appropriate for stability requirements and erosion control. Also, the DOI proposal for stabilizing the highwalls within the pits appears to be a safer approach to the problem than in the Anaconda alternative. The Laguna Proposal and DOI Proposal (Drainage Option) would also suffice, but the cost is somewhat higher.

We noticed that a five-foot high berm is to be constructed along the outer perimeter of the crest of each waste dump in the DOI proposal to reduce the quantity of runoff down the slope. With the 100-year, six-year storm producing only three inches of rainfall and even the probable maximum precipitation six-hour event only 15 inches, a lower berm, possibly two-feet high, would appear adequate.

If we can be of further assistance, please advise.

Sincerely,

Madison McCulloch
Madison McCulloch
Director of Technical Support



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

In Reply Refer To:
WGS-Mail Stop 423
DES 85/9

OCT 2 1985

Memorandum

To: Rio Puerco Resource Area Manager, Bureau of Land Management,
Albuquerque, New Mexico

From: Assistant Director for Engineering Geology

Subject: Review of draft environmental statement for Jackpile-Paguate
Uranium Mine Reclamation Project, New Mexico

We have reviewed the statement as requested in a notice of July 29 from the Rio Puerco Resource Area Manager, Bureau of Land Management, Albuquerque, New Mexico.

Our review notes that a principal cause of concern producing considerable difference in the alternative proposals is the possibility that ground-water recovery levels may be sufficiently high and be the major cause of ponding in mine pits above the backfill level. Depending on the ground-water model used and the input data chosen, projected ultimate ground-water recovery levels may exhibit a considerable range. Use of the U.S. Geological Survey generic model for two-dimensional ground-water flow has demonstrated that variation in recharge and hydraulic conductivity would cause significant water-level differences within the reclaimed mine pits. Limitations on data precision should be recognized in applying model results. In particular, field and laboratory testing of hydrologic properties usually sample only limited portions of an aquifer, most aquifers are not uniform throughout their extent, and test and computation methods have accuracy limitations. These constraints plus the inherent limitations of any ground-water model suggest that adequate allowance for degree of accuracy should be made in the application of results to specific situations. Thus it would seem reasonable to apply a worst-case analytical approach so as to fully consider available mine-pit reclamation methods.

Security and isolation measures are planned only during the reclamation phase and limited monitoring phase. After reclamation, reduced pit-wall slopes would presumably provide easier access to any toxic impounded water for both animals and human beings. Remedial action(s) might be required to ensure safety for the human environment over an extended period of time. In any case, long-term monitoring should be considered a high priority.

13-1 Consideration should be given to assure adequate depth of backfill above the water table following establishment of ground-water equilibrium. Such action will reduce the effect of a capillary fringe and any appreciable vapor transfer above the water table from reaching the land surface. Long-term direct evaporation from bare soil can be appreciable where the depth of the water table is 1 to 2 meters; evapotranspiration can be effective to much greater depths. If marginal backfill depth is provided, these evaporative mechanisms will result in the concentrating of dissolved constituents in the unsaturated zone.

Review of the accompanying Argonne National Laboratory's report on the radiological impacts of Jackpile-Paguate uranium mines suggests that permeability differences between the Jackpile Sandstone and the backfill in the Jackpile pit may result in increased accumulation of ground water in the backfilled pit with resultant higher levels and increased potential for exposure of a free water surface. The Argonne report suggests a continuous gradient through the backfill and the downgradient Jackpile Sandstones; however the much lower permeability of the Jackpile Sandstone as compared with that of the backfill (hydraulic conductivity of 0.3 ft/day for the Jackpile versus 190 ft/day for the backfill) should produce a negative or low permeability boundary effect with consequent rise in ground-water levels within the backfill.

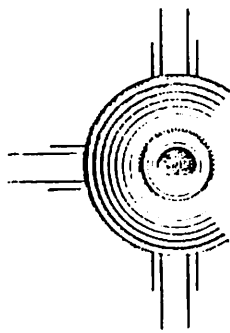
13-2 Another significant point of difference in the action proposal concerns methods to be used in sealing vent holes. The statement should discuss the construction of the vent holes, indicating whether they are lined and, if so, with what type of material. Anaconda proposes to use a 10-foot concrete surface plug pinned to the walls or belled to prevent downward movement in the hole. The consequences of leaving the vent holes open below the concrete surface plug should be analyzed. The analysis should address the possibility of radon accumulation in the hole, the effects of the rise of ground water in the hole, and the potential for eventual movement of undesirably mineralized ground water into the upper aquifers via open portions of the vent holes.

We suggest that the statement should also address the significance and amount of long-term compaction and consolidation which will occur in the backfill. The significance of these processes should be assessed in planning the amount of backfill and in anticipating the depths to the predicted ground-water recovery levels.

13-3 We note that a part of the definition of hydraulic conductivity has been omitted on page G-6. The definition should include, "under a unit hydraulic gradient."


James F. Devine

Copy to: District Chief, WRD, Albuquerque, NM
(information only)



Council of Energy Resource Tribes

1430 Logan Street - Suite 400
Denver, Colorado 80203-1241
(303) 832-6600

Executive Committee: October 1, 1985

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Chairman
Diné Dine

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Cherokee

Jude Knight
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Diné Mountain Ute

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Southern Ute
Spokane
Tule River
Tututilla
Ute
Walker River
Zuni Pueblo

Executive Director:
A. David Lester

Mr. Mike Pool
EIS Task Force Leader
U. S. Bureau of Land Management
Albuquerque, NM 87102

Dear Mr. Pool:

Herewith, I am submitting the Council of Energy Resource Tribes's (CERT), comments on the Draft Environmental Impact Statement, (DEIS), which was prepared by the U. S. Department of the Interior, (DOI), on the Jackpile-Paguate project.

The Council of Energy Resource Tribes believe in the EIS process and have noticed the DEIS' improvement over the FDEIS, for which you and the members of the EIS Task Force are congratulated. Nevertheless, there are areas in the DEIS which could, further, be improved. We are not in support of Anaconda's recent Multiple Land Use Plan, though it could be included as a case in the EIS. However, to protect and safeguard the interests of the Pueblo of Laguna Tribe, we leave it up to DOI's judgement to select a preferred alternative and issue a Record of Decision.

With best wishes for your continued success.

Sincerely,

Ronald L. Esquerra Ph.D., Chief Operations Officer
COUNCIL OF ENERGY RESOURCE TRIBES

RLE/js
Attachments

cc: Mr. T. Fernando, Governor
Pueblo of Laguna

14

**COMMENTS
ON
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
ON
THE RECLAMATION
OF
THE JACKPILE-PAGUATE URANIUM MINE**

BY

**Council of Energy Resource Tribes
1580 Logan Street, Suite 400
Denver, Colorado 80203
(303) 832-6600**

October 1, 1985

1.0 GENERAL COMMENTS

Is it the policy of the Council of Energy Resource Tribes (CERT), to hold the Department of the Interior (DOI) accountable for its fiduciary responsibility, for prescribing and involving the applicable regulations to get the Jackpile-Paguate Mine site reclaimed. CERT feels that the DOI has produced a Draft EIS which is technically defensible, financially fair, and legally within bounds of its authority. The document's improvement over the Preliminary Draft EIS is obvious, though it still contains shortcomings on health hazards and damages to homes in the village of Paguate. CERT urges the DOI to take a positive and constructive position in discharging its trust responsibility.

Attached to these comments is a resolution which was passed by the Board of Directors of the Council of Energy Resource Tribes, which is composed of 40 Indian tribes endowed with energy resources. The Pueblo of Laguna Tribe is a founding member. The Resolution was passed by the Board unanimously in its September 26, 1985 session.

2.0 MINE SITE

Anaconda, during 29 years of its mining activity from 1953 to 1982 on the Pueblo of Laguna Reservation, hauled over 400 million tons of material with 25 million pounds of yellow cake on three leases which covered 7,868.59 acres of land. The leases included three open pits, which are known to be the largest in the world, and nine underground mines, and provided the U. S. government with its needed uranium resource. As a result of mining for 29 years, 2,656 acres of surface were disturbed with open pits, waste dumps, protore stockpiles, contaminated roads and river beds.

It was in response to its obligations and commitment to reclaim the Jackpile-Paguate mine site that Anaconda submitted a number of gradually improved mine/reclamation plans from November 1973 to August 1981. The 1981 reclamation plan, known as the "Green-Book" Plan, though it is beset by a series of shortcomings, demonstrated the company's intention to reclaim the site. Clearly, the purpose here was to improve upon the building blocks of harmony and fairness that ARCO and Anaconda leaders instituted in their relationship with Indian tribes in general and the Pueblo of Laguna in particular. The Green-Book Plan was pronounced by a very high authority at Anaconda as a responsible and technically defensible plan.

The Green-Book Plan was developed by the company utilizing the results of several years of experience in reclaiming 485 acres of the Jackpile-Paguate Mine by Anaconda in conjunction with operations of the mine. Further, it took into account the results of extensive environmental investigations conducted by the company and its consultants and reflected guidance provided by the Pueblo of Laguna Tribe. The goal of Anaconda was to reclaim the disturbed area in such a way as to allow the optimal use of the land while protecting the natural resources of the area. The goal considered the guidelines set forth in a letter of June 9, 1980 of the Pueblo of Laguna Tribe.

The participation and cooperation of Anaconda in various meetings and forums have given the indications that it has implicitly accepted the EIS process. It was in response to the Interior's request that Anaconda, not only placed a \$45 million bond, but developed the Green-Book Plan to address the reclamation issues adequately and

responsibly. On the basis of the Draft EIS, the difference in reclamation cost between what the Interior has estimated to be adequate and what the company came to accept in the latter part of 1980 as reasonable was not substantial and could be bridged if the company had not reversed itself by offering its 1985 plan. CERT feels that the Interior has produced a Draft EIS, which is technically defensible, financially fair, and legally within bounds of its authority. The document has certain shortcomings on health hazards and damages to homes in the village of Paguate as will be explained later.

It has been claimed that the Interior and the tribe did not respond to the many plans that Anaconda had submitted in the past. It must be noted with confidence that the tribe has always acted in good faith and with a desire to resolve the matter with fairness and equity. All Laguna tribal leaders have been concerned about, not only the well-being of their own people, but those who have been exposed to the hazardous consequences of inaction with respect to the site reclamation.

It is important to note that the tribe had to start from zero information to decide. Anaconda never shared its reclamation information with the tribe with a view to help the tribe to initiate action. Now, with the help of CERT and other organizations, the tribe is in a position to march forward and resolve the matter. As a matter of fact, the tribe informed the company in June 1985, that it is ready to negotiate a settlement to be included in the Final EIS. The tribe has been ready to resolve the differences between what was rationally advocated in the Green-Book Plan and the Laguna plan using available legitimate forums and processes.

With the evidence of rationality and prudence up to May 1985, Anaconda withdrew its 1981 plan in August 1985, and replaced it with a plan which is now called the "Multiple Land Use Reclamation Plan." The 1985 plan calls for the removal of hazardous waste material existing in the river beds of the Rio Paguate and Rio Maquino and be used as backfill in North Paguate pit. It also proposes that the ore-associated waste of waste dumps from sloping may be relocated and used as pit backfill including the North Paguate pit. Then, it proceeds to recommend that the North Paguate pit be used as a water storage reservoir. This is, indeed, a far cry from what the leaders of ARCO and Anaconda have advocated for the Indians in the past.

The 1985 plan of Anaconda ostensibly states that the pit highways are all stable and need not require any reclamation action. This belies the statements of truism that one finds in the Green-Book Plan. When pit highwalls with a potential for failure were evaluated, in the Green-Book Plan in terms of long-term stability, Anaconda registered its opinion in print that the Jackpile highwalls is a case where the stability of the wall was questionable and decided to include action in the 1981 plan to render it safe for the postmining proposed usage. Methods which were suggested to be utilized to improve highwall stability were buttressing the base of the wall and removing a portion of the highwall at its crest.

The 1985 reclamation plan has made no mention of the groundwater recovery level for the proposed reclamation area. To that extent, there is no mention of backfilling the pits to a given level with a moderate and reliable level of cover for the backfill. In fact, it claims that the statement in the Green-Book Plan that in order to afford groundwater protection, the pits must be backfilled to an elevation of three feet above the projected level of recovered of the water table is incredibly ludicrous. The 1981 plan proposed that the three pits be backfilled to the 5,932 to 6,053 feet levels. The backfill materials would consist of protore, waste dumps H and J, and excess material obtained from waste dump resloping and streams channel clearing. These materials would be covered with four feet of overburden and one foot of topsoil.

In the 1981 proposed plan, it was indicated that during mining operations dust containing hazardous particulates, control was maintained by application of water to haul roads. The Green-Book Plan, in recognition of the air quality impact, attempted to undertake reclamation as soon as possible. The 1985 proposed reclamation plan implies that there is no imminent problem associated with airborne particulates and may allow the debate on reclamation to prolong aimlessly. This attitude runs counter to the public statements that the captains of the ARCO complex have uttered in the past.

In the 1981 plan, the basic objectives involved in dump reclamation were slope stability, erosion control and establishment of vegetation. In the case of Jackpile sandstone waste dumps, an additional objective was declared to be to discourage the removal of this Jackpile sandstone for possible use in construction or other purposes by placing a minimum of five feet of cover over this type of material. In 1985, the

entire problem has been assumed away and the reservation and the surrounding areas are considered safe to live on.

CERT is astonished by the fact that Anaconda has turned its back on the tribe and is now pursuing a course of action which will not be at all conducive to the Indian-industry relationship that the present administration has advocated. The Department of the Interior is likewise disdainful of the views and needs of the Pueblo of Laguna. The Draft EIS has indicated that the Department of the Interior is responsible for determining the proper level of reclamation for the Jackpile-Paguate uranium mine. The tribe has maintained a major concern on a series of issues which they feel are germane to an acceptable reclamation plan. Nevertheless, the Bureau of Land Management, as evidenced by the Draft EIS, considered these issues to be irrelevant to a reasonable reclamation plan.

14-1 First, there are a number of reclamation issues that have passed BLM's notice. The DEIS does not discuss the design life for any of the reclamation alternatives, although the Anaconda and DOI's alternatives have a design life. What is important is whether or not this design life is structured long enough to prevent erosion in time. The question is, also, whether the design life in the DOI's alternatives withstand the forces of a few major rainfalls, floods, or earthquakes. In order for the tribe to be protected against all possible hazards and negative consequences, the DOI ought to provide for long-term protection in its preferred alternative. These long-term provisions should be structured to guarantee the safety of reclaimed open-pits, stability of high walls, protection against erosion of waste pile slopes. These provisions could only be secured in case the preferred alternative includes a long-term monitoring, and maintenance scheme. The Draft EIS, moreover, appears to have embraced the Anaconda hydrology study. The Draft EIS does not explain as to why it has included the results of Anaconda's modeling of the ground water recovery levels used to assess ground water impacts. Inasmuch as the hydrology issue is of fundamental importance to the Tribe, it is necessary that the DOI include in its final EIS a complete explanation of its decision.

Although the residents of the village of Paguate have raised the question of damages to homes in their village, neither the Preliminary Draft EIS nor the Draft EIS has addressed it. In fact, the Draft EIS considered this issue as irrelevant to reclamation. If one reads carefully the leases granted to Anaconda, one is left with

the strong impression that such an issue is, in fact, in the heart of reclamation. So is the question of possible psychological effects that the mining operations and mine closure had on the Laguna people.

14-2 | The tribe has, on many occasions, requested the Indian Health Service (IHS) to investigate the possible health impacts that mining operations had on former miners and residents of the Pagate village. The tribe has identified the need for a health profile on the residents and miners as affected by Anaconda mining. The Bureau of Land Management (BLM) has rejected the request as irrelevant to reclamation and IHS has done nothing substantive to shed light on the subject matter. Studies, general in nature, have been conducted by IHS, but they have failed to provide definite recommendations. The failure of IHS has militated against tribes taking positive steps to ameliorate the present conditions.

14-3 | The Pueblo of Laguna Indian Tribe has two concerns with respect to disposition and placement of protore. First, it has suspected the protore may have been used to backfill the "Rabbit Ears" area in preparation for the realignment of S. R. 279. No attempt has been made to disprove the tribe's position. In fact, the Draft EIS has categorically stated that protection of the protore, unmined deposits and existing mine workings is outside the scope of the EIS. Secondly, the Draft EIS has implied that the protore is to be placed in all three pits. However, a hard look at where to place the protore stockpiles is of economic significance to the tribe, an issue which has passed unnoticed by BLM in its Draft EIS. The Green-Book Plan of 1981 by Anaconda pays a good deal more attention to the subject while the company's 1985 plan leaves all protore where they are.

14-4 | The Bureau of Land Management has rejected as not within the scope of the EIS the siltation of Pagate Reservoir as a result of past mining operation. The tribe has also been perturbed by the limitation of the flow of irrigation water to the village of Mesita. Moreover, the Interior agencies have, in the past, acknowledged the increased radiological contamination through sedimentation of Quirk Reservoir during mining operation. Nevertheless, the importance of the issue and tribal concerns have passed unnoticed by BLM in its Draft EIS.

14-5 | A curious fact of energy management on Indian reservations has been the absence of any meaningful and conducive impact from energy development on reservation

14-5(Cont.)

economy. The Laguna case is no exception. The company operated on the Laguna reservation for 29 years, produced close to 25 million pounds of U_3O_8 , and paid wages and royalties. Yet, today the tribe's per capita income is no more than \$2,000.00 with a 40% unemployment rate. The Draft EIS has indicated that increased job opportunities due to reclamation, in the manner proposed under the Green-Book Plan and the DOI's alternatives, would temporarily decrease the existing unemployment and social problems. However, as reclamation, in the sense of EIS, progresses and the work force is reduced, unemployment would resume and associated social problems would reappear. Of course, with Anaconda's 1985 plan, there would be no employment impact to be expected. It is unfortunate that even the Draft EIS does not define reclamation as a long-term employment generating activity to be undertaken.

These are CERT's concerns which CERT requests to be included in the Final EIS so that the tribe could, in the post-mining period, address and attend to the social-economic issues it has been faced with during these bleak and unfortunate years since 1982 when the mine was shut down. CERT's concern is also for the non-Indian people, within a fifty mile radius from the mine site, who in Albuquerque and Santa Fe, and Grants, because of a possible flood in the area, will be impacted irreparably and irretrievably. The level of contamination on the roads, the dust particles, which are now uncontrolled, and the results of a possible flood in the mine area could bring disastrous consequences for which the company ought to be held responsible.

Council of Energy Resource Tribes
Resolution NO. 85-
MINE ABANDONMENT RADIATION STANDARDS

WHEREAS, in excess of 300 inactive uranium mines dot the landscape of Indian nations, and

WHEREAS, these inactive uranium mines pose real and potential radiation exposure to Indians, and

WHEREAS, some mine wastes have been used for dwelling construction and many dwellings are located near mines, and

WHEREAS, mine water has been used for stock watering and drinking purposes, and

WHEREAS, the effects of these mines on the health of Indians are unknown,

WHEREAS, no radiation standards now exist for abandonment of uranium mines to assure long-term health and safety protection of nearby residents,

NOW THEREFORE BE IT RESOLVED that the Council of Energy Resource Tribes request and encourage the development of applicable standards by the U. S. Environmental Protection Agency to prevent existing and future health risks to the Indian population from inactive uranium mines, and

BE IT FURTHER RESOLVED that these standards be applied to all reclamation plans and activities associated with uranium mines on Indian lands.

CERTIFICATION

The undersigned Chairman and Secretary of CERT certify that the above resolution was adopted by the Board of Directors at a meeting duly held the 26th day of September 1985.

Chairman

Secretary

PUEBLO OF LAGUNA

P.O. BOX 194

LAGUNA, NEW MEXICO 87028

Office of:

The Governor
The Secretary
The Treasurer

(505) 243-7616
(505) 552-6654
(505) 552-6655

October 2, 1985

Mike Poole
EIS Team Leader
USDI-Bureau of Land Management
3550 Pan American Freeway, N.E.
P. O. Box 6770
Albuquerque, NM 87197-6770

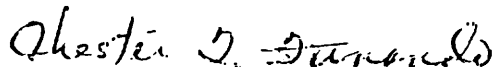
Dear Mr. Poole:

Enclosed please find the comments prepared by and on behalf of the Pueblo of Laguna. This package includes Comments Prepared by the Pueblo of Laguna, Jacobs Engineering, the Council of Energy Resource Tribes and Nordhaus, Haltom, Taylor & Taradash.

Although these comments address many of the same issues and therefore may appear to be redundant, I trust you will understand that they are given to you from entirely different perspectives.

I wish to take this opportunity to thank you and the rest of the Task Force members for your patience and for granting us an opportunity to present our input and express our concerns.

Very truly yours,



Chester T. Fernando, Governor
Pueblo of Laguna

CTF:mkw
Encl.

**Comments of the Pueblo of Laguna
on the Draft Environmental Impact Statement
on the Reclamation of the
Jackpile-Paguate Uranium Mine**

October 4, 1985

The Pueblo of Laguna respectfully submits these written comments regarding the Draft Environmental Impact Statement on the reclamation of the Jackpile-Paguate uranium mine and requests consideration of its concerns in the preparation of the Environmental Impact Statement.

15.1 From October 18, 1951 to the cessation of mining operations at the Jackpile-Paguate uranium mine, the Anaconda Company removed over 400 million tons of material. The ore removed by Anaconda had a value in excess of \$600 million. Although thousands of Pueblo members worked at the mine during its operation, since the mine closing, unemployment has risen at the Pueblo to over 70% and per capita income has decreased to approximately \$2,000 per person. The socio-economic impact of the failure of the Anaconda Company to provide adequate pension plans for the mine employees has been severe. Yet, the DEIS addresses neither the socio-economic impact of the mine closing nor reclamation. This impact on the Pueblo of Laguna seems to the Pueblo to be one of the more serious omissions in the DEIS.

Approximately fifty percent of the residents of the State of New Mexico live within a fifty mile radius of the Jackpile-Paguate mine which is the largest open pit uranium mine in the United States. Included in this population count is the Albuquerque metropolitan area and the City of Grants. Further, the mine straddles the Rio Paguate and the Rio Moquino, the waters of which flow into the Rio Puerco and ultimately into the Rio Grande. Thus, the environmental effects of the

unreclaimed mine touch the lives and property of a substantial portion of the State of New Mexico's 1.3 million inhabitants. Total reclamation, satisfactory to the federal government, the Pueblo and all affected citizens of the State of New Mexico is, therefore, essential. In order to fulfill this responsibility the mine must be reclaimed in order to: 1) eliminate all health and safety hazards caused by mining operations; 2) return the land to productive land uses; and 3) provide for the long-term stability of the reclaimed site so that public health and safety hazards do not recur.

After four and one half years of study by the BLM, the substantially completed EIS process has failed to study numerous aspects of a reclamation effort which would lead to a satisfactory reclamation plan. Among those matters which must be considered to ensure effective reclamation of the mine site and provide for its long-term stability are:

- * An appropriate level of compensation for blast damage that occurred in the Village of Paguate during mining operations.
- * A reduction in the slope of all high walls, especially the north Paguate high wall, because of its proximity to the Town of Paguate.
- * Backfilling the open pits to at least ten feet above the projected groundwater recovery levels and establishing effective procedures for monitoring and raising the level of backfill in the future should groundwater recover to a higher level than projected.

- * Removing all contaminated material from the river flood plain, taking into consideration a 100-year flood.
- * Covering all contaminated material with a minimum of four feet of uncontaminated materials and one foot of soil.
- * Reducing all slopes to no greater than 3:1.
- * Decontaminating or removing all buildings and the railroad spur where numerous ore spills have occurred.
- * Revegetating the site.
- * Providing effective procedures for the long-term monitoring and maintenance of the site.

15-2 | Of particular concern to the Pueblo of Laguna are the discrepancies in the projected groundwater recovery levels between the various studies which have been performed. The discrepancies, which will affect the very limited and precious water resource of the Pueblo of Laguna, must be resolved. Of equal importance to the future generations of Lagunas is a mechanism for the long-term maintenance of the mine site and identification of an appropriate design life for the reclamation alternatives. These matters must be resolved and addressed in the EIS.

It is rather surprising that during the thirty years of mining operations at the Jackpile-Paguate mine, there were no actions taken to remediate the water problems, study and mitigate the radiological hazards to the human and animal

environment, to clean up spillage which occurred along the rail spur and other locations along haul routes which pass through numerous communities both on and off the reservation, or to study the impacts of the mining on the water and air.

As was expressed by the numerous Pueblo members who made public comments on the DEIS at the hearings held September 10 and 11, the following issues have not been addressed or have been inadequately addressed by the DEIS:

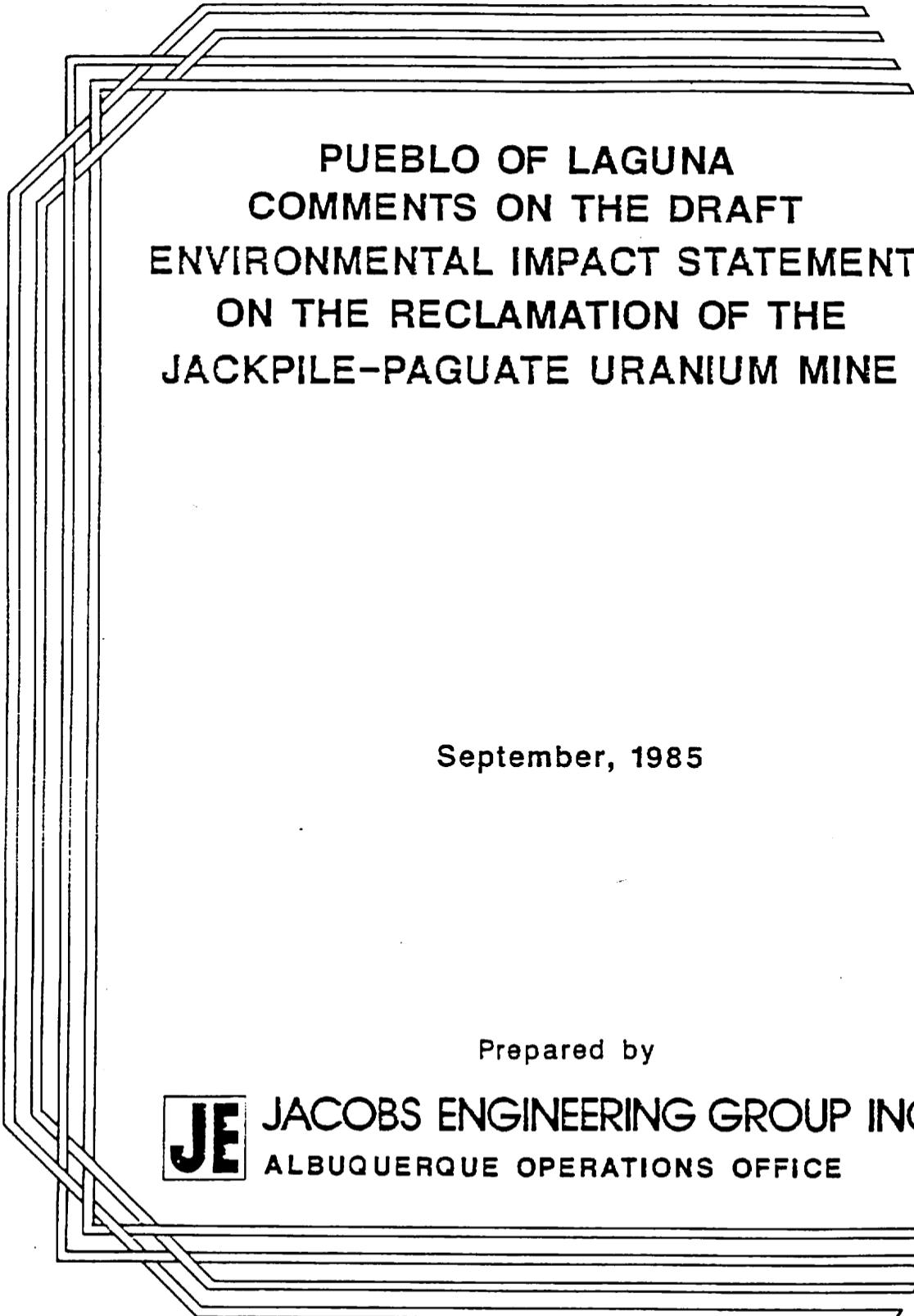
- * Siltation and the increase in radiation of the reservoir downstream from the mine site.
- * Damage to structures in the Village of Paguate from blasting during mining operations.
- * Return of the mine site to its pre-mining use as farm and range land.
- * Investigation of the health impacts on members of the Pueblo and other mining employees that occurred during mining operations.

15-3 Neither the DEIS nor any of Anaconda's six reclamation plans has addressed the religious significance of the land to the Pueblo members. Both BLM and Anaconda must be mindful that the land and particularly the mined area contain numerous religious shrines and have deep religious significance for the Pueblo of Laguna people.

15-4 Further, it is a contractual and regulatory requirement that Anaconda protect the health and safety of all people from hazards at the mine site. The Pueblo's

15-4(Cont.) primary concern is radiation induced cancer and birth defects caused by exposure to radioactive materials and dust originating from the mine site. These hazards must be studied and the dangers must be mitigated.

Substantial progress has been made by the DOI toward resolving the many complex issues related to this massive reclamation project. It is the Pueblo's sincere hope that these matters of great concern to the Pueblo members as set forth herein will be addressed.



**PUEBLO OF LAGUNA
COMMENTS ON THE DRAFT
ENVIRONMENTAL IMPACT STATEMENT
ON THE RECLAMATION OF THE
JACKPILE-PAGUATE URANIUM MINE**

September, 1985

Prepared by



**JACOBS ENGINEERING GROUP INC.
ALBUQUERQUE OPERATIONS OFFICE**

PUEBLO OF LAGUNA
COMMENTS ON THE DRAFT
ENVIRONMENTAL IMPACT STATEMENT ON
THE RECLAMATION OF THE JACKPILE -
PAGUATE URANIUM MINE

September, 1985

General Comments

Overall, the Draft Environmental Impact Statement (DEIS) prepared by the U.S. Department of Interior (DOI) on the Jackpile-Paguate Project represents a significant effort on the part of the preparers and makes a large contribution towards the resolution of the many issues and concerns that have been raised on the project. However, there are a number of areas that require additional effort before the DOI can select a preferred alternative and issue a Record of Decision.

Among the unresolved issues are: compensation for damage to homes and other structures in the Village of Paguate, discrepancies in the projected ground water recovery levels, providing a mechanism for the long-term maintenance of the mine site, and identifying an appropriate design life for the reclamation alternatives. Other issues which the DEIS has not adequately addressed are: land use impacts, air quality impacts during reclamation, costs, revegetation success, and drainage of the reclaimed site.

Our specific comments are identified below.

Long-Term Stability

15-5 The primary goal of reclamation, as stated on page 1-10 of the DEIS, is to stabilize the mine site. However, the DEIS does not contain a discussion of the design life for any of the reclamation alternatives. At a minimum, reclamation should be designed to withstand 100-year rainfall, flood, and earthquake events. Any of these major events could damage the site. For

15-5(Cont.) example, a major flood in the Rio Moguino would strip away the vegetation, soil, and cover of dumps S, T, and V. The hazardous material in these dumps would then be exposed and subject to erosion.

Additional environmental components which would become unstable under any of the reclamation alternatives addressed in the EIS are as follows:

1. Open Pits

Salts will build up in the soils of the undrained pits and destroy the vegetation.

2. Highwalls

Even though the highwalls may be scaled and partially sloped during reclamation, rock falls will occur. The fractures, joints and blasting cracks will be widened and lengthened by erosion and sections of the highwalls will become unstable. The highwalls created by blasting during mining operations are not nearly as stable as the cliffs formed over thousands of years by natural forces. Routine rescaling and resloping of portions of the highwalls will be necessary to eliminate the hazards created.

3. Waste Pile Slopes

Even if the waste piles are sloped to 3:1 they have the potential to erode. As drainage from the top of the dumps cuts channels in the

slopes, the hazardous materials in the dumps will be exposed and subject to erosion. Included in this material are uranium, radium, thorium, polonium, and radon as well as many heavy metals. Erosion of the dumps would cause these elements to enter the hydrologic, atmospheric and food chain exposure pathways. This is likely to occur to a very limited degree almost immediately after reclamation and could become extensive over a period of several decades if it is not mitigated.

Piping will also occur on all of the waste dumps and would result in extensive erosion without routine maintenance.

The only effective ways to mitigate these long-term impacts would be to design the reclamation with a very long design life, or to establish a mechanism for the long-term monitoring and maintenance of the site such as providing the Pueblo with the financial resources to establish a long-term monitoring and maintenance program.

Long-Term Monitoring

15-6 As previously stated, the long-term stability of the site would be uncertain under any of the reclamation alternatives addressed in the DEIS. Since the project involves the isolation and stabilization of radioactive material, it is imperative that long-term, systematic monitoring of the success of reclamation and the stability of the site be implemented.

The longest monitoring period identified in the DEIS for the DOI alternatives is 5 years, which is discussed only in reference to monitoring

revegetation success. Monitoring of such a short duration would not be useful in evaluating the accuracy of the ground water recovery projections or the success of the long-term erosion protection measures.

A long-term monitoring program should be included in each of the alternatives and should include monitoring sheet wash and rill erosion, flood impacts, ground water recovery levels, highwall stability, waste pile slope stability, and vegetation density. The reclamation alternatives should be modified to include this long-term monitoring.

Long-Term Maintenance

15-6(Cont.) The mining activities have altered the chemical and physical properties of the rock at the mine site and made them very susceptible to wind and water erosion. The waste rock also contains toxic elements such as selenium (DOI, 1984) and the site contains public safety hazards. As previously discussed, the reclamation alternatives addressed in the DEIS do not provide for long-term stability of the site. In order to protect the public from these hazards and provide for long-term productive use of the site, the mine site will require long-term maintenance regardless of which reclamation alternative is selected. Maintenance activities that will be required include:

1. Repair of erosion control berms.
2. Scaling of highwalls that become unstable.
3. Repair of arroyo stabilization structures.
4. Regrading and revegetating eroded areas.
5. Replacement and repair of fencing.

6. Replacement of soils in the open pits that become contaminated with salts.
7. Adding additional backfill if the ground water rises higher than projected.
8. Repairing the impacts of floods.

None of the reclamation alternatives evaluated in the DEIS contain provisions for the long-term maintenance of the reclaimed site and should be modified accordingly.

Site Drainage

The DEIS does not identify how surface runoff would be directed off of the mine site. All of the alternatives include directing surface runoff away from the outer surface of the waste dumps but do not discuss how this runoff would be directed off of the site to the natural drainages. With the information provided, it appears that much of the mine site (not just the open pits) would be internally draining basins. The alternatives should be designed to direct surface water off of the mine site to the maximum extent achievable to prevent the buildup of salts in the soils and the associated denuding of vegetation.

The EIS should contain a grading plan for each of the reclamation alternatives.

The waste dump slopes previously revegetated (dumps S, T, O, D, E, F) are showing signs of accelerated erosion less than 10 years after reclamation.

This is strong evidence that the slopes steeper than 3:1 are too steep to inhibit erosion to an acceptable level. The DOI should require all slopes, including those previously reclaimed, be reduced to a slope of no greater than 3:1.

Blast Damage

One of the key issues and concerns of the project as stated on page 1-13 of the preliminary DEIS is the "structural damage from blasting during the mining operations to the homes in Paguate." This issue should be addressed in the DEIS. In addition, the DOI should address the issue of cosmetic damage to the homes in Paguate since cosmetic damage can be very costly to repair.

15.8 The DOI should collect site-specific data on the attenuation of ground vibrations between the mine site and the Village of Paguate and site-specific data on the effects of varying velocities of ground vibration on the buildings in Paguate. The extrapolation of ground vibrations from data collected at the mine site and the comparison of the effects of blasting on frame structures are not accurate methods of assessing the damage in the Village of Paguate.

The DOI's evaluation of the blast damage issue should address the following issues:

1. The operator continuously performed structural and cosmetic repairs to the homes in Paguate during mining operations (DOI, 1985).
2. The U.S. Bureau of Mines recommended that blasting during reclamation operations be limited to produce a maximum ground vibration of

0.2 inches/second (DOI, 1984) which is less than one tenth of the strength of some of the blasts that occurred during mining operations (Oriard, 1982).

- 15-8(Cont.)
3. The residents of Pagate repeatedly experienced significant shaking of their homes (DOI, 1985).
 4. The U.S. Bureau of Mines has stated that ground vibrations as low as 0.5 inches/second could damage the homes in Pagate (DOI, 1984), and blasts during mining operations exceeded this level (Oriard, 1982).
 5. The operator did not monitor airblasts which also could have caused damage. The U.S. Bureau of Mines has recommended that blasting not be allowed during reclamation operations when the wind is blowing from the east to protect the Pagate homes from airblast damage (DOI, 1984). Blasting during mining operations occurred regardless of the wind direction.
 6. The DOI did not collect any data to verify the accuracy of Anaconda's seismic data.
 7. Studies have not been performed to evaluate the effects of blasting over an extensive period of time such as the 30 years that blasting occurred at the Jackpile-Pagate Mine.
 8. The operator did not collect seismic data at locations where the damages were being assessed in Pagate. Instead, data was collected

around the periphery of the mine site. The site-specific ground conditions between Pagate and the seismograph locations were not evaluated during the extrapolation of ground velocities between the mine site and Pagate (Oriard, 1982).

9. The particle velocity standard of 2.0 inches/second used by the DOI and Anaconda is a design standard not a performance standard (30 CFR Parts 175 through 817).
10. The houses in Pagate are primarily of adobe and stone construction which is much more susceptible to blast damage than the frame structures used in the U.S. Bureau of Mines studies referenced in the PDEIS.
11. No data is available on the size of the blasts that occurred prior to 1966. These blasts may have been strong enough to cause structural damage (Oriard, 1982).

Where blast damage is a potential problem, it is standard industry practice to conduct a survey of the pre-blast condition of the structures near the mine, design the blast to account for site-specific conditions, monitor ground vibration and airblast at the structures of greatest concern and compensate the owners of the damaged structures.

Hydrology

The hydrology sections are not sufficiently complete to enable a thorough review. Additional information which should be included in the EIS include:

- 15-9 1. Location of monitoring wells.
- 15-10 2. Description of the ground water models and calibration procedures.
- 15-11 3. A map of the projected post-reclamation potentiometric surface.
- 15-12 4. Post-reclamation grading plan.
- 15-13 5. A map showing the existing potentiometric surface.
- 15-14 6. Location of surface water samples.
- 15-15 7. Location, composition, and dimensions of the cut-off wall proposed by
Anaconda.

15-16 The DEIS should explain why the Dames and Moore modeling of the ground water recovery levels was used to assess ground water impacts instead of using the ground water modeling performed by Argonne National Laboratory (ANL). The ANL modeling was performed for the EIS Task Force and represents an independent analysis of the recovery levels. The ANL modeling predicted a significantly higher recovery level than did Anaconda's modeling and this difference may be the result of selecting more realistic input parameters (ANL, 1981).

The applicant's proposal includes backfilling to only three feet above the projected ground water recovery level. The U.S. Water Resources Division's evaluation of Dames and Moore's ground water model showed that modest

adjustments in the model input parameters resulted in recovery levels greater than 50 feet above Dames and Moore's projections (USGS, no date). With such a wide variation in the estimated recovery level, a three-foot confidence level is not appropriate.

The DOI monitor alternative attempts to resolve the disagreement over the ground water recovery levels by including provisions to monitor the recovery level and add fill if the recovery level is higher than estimated. Page 3-27 of the DEIS states that 30, 150, and 300 years would be required for the ground water to reach its maximum height in the North Paguate, South Paguate, and Jackpile pits, respectively. Many decades of monitoring would be required before a determination could be made on the accuracy of estimated recovery levels and there is no guarantee that the applicant would be available or have the financial resources to add additional backfill in the future. The DOE should consider the establishment of a ground water mitigation fund which would be invested to earn interest and would be used only to add backfill to the pits if the ground water rose to a level higher than predicted by Dames and Moore.

If the ground water recovers to the level projected by Dames and Moore it will be only three feet below the surface. Capillary action of the ground water could transport salts from the ground water into the upper layers of soils. Upon the evaporation of the water that has risen by capillary action, the salts will remain in the soils and prevent the growth of all but the most salt-resistant plants. The backfill level should be at least 10 feet above the final ground water recovery level to prevent this salt buildup.

In order for a cut-off wall to be effective, it must be keyed into material with a very low permeability. Neither the DOI nor the applicant is proposing to key the cut-off wall into the shale that underlies the Jackpile Sandstone and the DEIS should evaluate the effectiveness of the cut-off wall under these conditions.

In summary, the ground water recovery and backfill level issues remain unresolved.

Costs

The cost items listed in Table 1-6 do not appear to contain many items which would be required for each of the alternatives. Among the major items for which costs have not been presented are:

1. Removal of contaminated soils along roads and around the surface facilities.
2. Construction and environmental management.
3. Compaction of the cut off wall.
4. Placement of cover on the waste dumps and within the area of the pit that would not be backfilled.
5. Insurance and bonding.
6. Environmental data collection and analysis.

15-17

7. Grading and seeding roads on Black Oak Mesa.
8. Overall site contouring to provide drainage.
9. Sloping interior waste dumps.
10. Treatment and discharge of pit water.
11. Mobilization and site preparation.
12. Decontamination or demolition of surface facilities.
13. Detailed planning and engineering.
14. Preparation of engineering designs.
15. Long-term monitoring and maintenance.
16. Contingencies for reclamation measures which cannot be precisely defined at this time.

The inclusion of these items in the cost analysis would provide a more accurate assessment of the total project-related costs.

The two DOI proposals include backfilling the upgradient portion of the North Paguate pit to a level approximately 65 feet above the level proposed by the applicant (page 1-13). In addition, the other pits would be backfilled to

15-18(Cont.)

a level 40 to 70 feet above the level proposed with an estimated 19 million cubic yards of material (page 1-13). However, the costs of backfilling under the DOI alternatives are only about \$1 million more than under the applicant's proposal. (Table 1-6). There are apparently significant errors in either the costs or the volumes presented in the EIS and these errors should be corrected in the Final EIS.

15-19

The volume of material that must be moved during the resloping of waste dumps differs greatly between the applicant's proposal and the two DOI alternatives; however, the costs are shown to be the same (Table 1-6). This discrepancy should be resolved in the Final EIS.

Table 1-6 states that the majority of the excess material from resloping the waste dumps will be placed into the pits. However, much of this resloping will be performed with graders and dozers which is much more cost-effective than relocating all of the material by truck to the pits.

15-20

In general, the DEIS apparently has errors in the volume and cost calculations and DOI should recalculate these items for the Final EIS. In addition, the DEIS should provide greater detail on the unit costs used and how the volumes were calculated, as well as for a more detailed breakdown of the individual costs.

Radiation

15-21

The projection of fatalities due to cancer of the lung, digestive tract, and other organs is based on a static population; however, the population of

15-21
(Cont.) the region is increasing and the radiological health impacts should be recalculated using a continually increasing population.

The risk of contracting cancer to the maximally exposed individual should be calculated. The maximally exposed individual is a person who builds a home on the mine site, consumes food grown on the site and consumes water from the site.

15-22 Also, a continually increasing source term should be used for any alternative which does not include complete and long-term stabilization of the site. As erosion of the site occurs, the hazardous material is dispersed over a wider area and the source term increases in size and thereby increases in magnitude.

Isolation of Mine Waste and Protore

In response to public concern over the potential public health hazards associated with uranium mill tailings and the associated contaminated material left abandoned or otherwise uncontrolled at inactive processing sites throughout the United States, Congress passed the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), Public Law 95-604, which was enacted into law on November 8, 1978. In UMTRCA, Congress acknowledged the potential health hazards associated with uranium mill tailings and identified 22 sites that were in need of remedial action.

The EPA published an Environmental Impact Statement (EIS) (EPA 520/4-82-013-2) on the development and impacts of the standards (40 CFR Part

192) and issued final standards (48 FR 590-604) on January 5, 1983, to become effective on March 7, 1983. In developing these standards, EPA determined "that the primary objective for control of tailings should be isolation and stabilization to prevent their misuse by man and dispersal by natural forces" and that "a secondary objective should be to reduce the radon emissions from the piles." A third objective should be "the elimination of significant exposure to gamma radiation from tailings piles."

Although the mine waste and protore at the Jackpile-Paguate mine is not mill tailings, it is the parent material of mill tailings and contains many of the same properties of mill tailings. The issues that the U.S. Congress, EPA, and DOE found significant for the reclamation of mill tailings are also significant for the reclamation of the Jackpile-Paguate Uranium Mine including the potential for misuse by man and dispersal by erosion.

Mill tailings have been removed from nearly all abandoned mill tailings piles and used as a construction material or as general fill in and around approximately 4000 homes, schools, and businesses. The Federal government is now funding the UMTRA project in an effort to clean up these contaminated structures. The costs of decontaminating these structures exceeds \$150 million. It is projected that this activity will prevent more than ten fatal cancers from developing every ten years.

A similar hazard could develop if measures are not taken to prevent the removal of the hazardous material, especially the protore, from the Jackpile mine site. The EPA's primary objective of isolation and stabilization for mill tailings should be applied to the Jackpile mine site. The hazardous

material, especially the protore, should be returned to the open pits and buried to prevent the removal of this material by man and erosion by natural forces.

1985 Plan

The 1985 Multiple Land Use Reclamation Plan has not been sufficiently described to enable a thorough review; however, based on the information available at this time, the plan appears to have the following deficiencies.

1. The long-term effectiveness of the phreatophytes to keep the level of the ground water from rising to the ground surface can not be guaranteed.
Fire or disease could destroy the phreatophytes and the contaminated water would very quickly form ponds on the surface. This option is therefore not acceptable.
2. Diverting the Rio Paguete into the North Paguete pit would wash the contaminated water and sediment downstream and would spread contamination along the channel of the Rio Paguete and the Rio San Jose.
3. Failure to place the protore into the open pits would leave this material in locations which are very susceptible to erosion from the Rio Paguete and Rio Moquino and unauthorized removal by persons who are not familiar with the hazards associated with this material.
4. Failure to place the four feet of cover on the protore and ore associated waste would not reduce the release of radiation to acceptable levels and

would leave the site very fragile. Any human use of the site under these conditions would pose the danger of exposing the hazardous material and thereby increasing the public exposure to this hazardous material.

Highwalls

Small failures of the highwalls have occurred since mining operations concluded. These failures are occurring primarily in the shale units and are reducing the support these units provide to the overlying sandstone units. As this process continues, larger failures of the highwalls will occur and will present an increasingly severe public safety hazard. The failure of the outer portion of the shale units should be factored into the highwall stability calculations and safety factors under dynamic conditions should be calculated.

Subsidence

15-23 Pages 2-23 and 2-26 state that almost 3.5 inches of subsidence have been recorded at one monitoring station over the P10/7 Mine (1500 stope) but that consultant studies (Seegmiller, 1982) have indicated that all underground mining areas, except the P-10 decline . . . are in a "low risk" category with regard to subsidence. Predicted amounts and rates of subsidence range from 1 to 12 inches and from zero to very slow, respectively. There is some conflict in these statements, and the discussion of the impacts of subsidence (pages 3-10 and 3-12) reflect this conflict. The only mitigation measure for subsidence that is identified is the proposed bulkheading and backfilling of the P-10 decline. The effects of subsidence on areas used by the public (e.g., Highway 279) and the necessary monitoring and mitigation should be described in the EIS.

Mine Entries

15-24 Page 3-12 states that ". . . all underground openings would be backfilled so" The applicant proposes to plug the ventholes and P-7 escape way with concrete but does propose to backfill these entries. Without backfilling, slippage of the concrete plugs in these entries could pose hazards that are not addressed in the DEIS.

Exploration Boreholes

15-25 Reclamation of the exploration borehole sites and access roads is not adequately addressed in the DEIS. Specifically, what will reclamation of the sites and roads consist of (e.g., grading, seeding)?

Ventilation Boreholes (Venthholes)

15-26 Details for sealing the ventholes should be discussed and should include the following:

1. Procedures for allowing settlement of the backfill material and refilling of the ventholes prior to placing the concrete plugs.
2. Details of the bellling-out and steel pinning procedures.

Future Mining

15-27 The DEIS should discuss the possibility of using special procedures to enhance the future recovery of the protore. For example, could the protore be

15-27
(Cont.)

placed in disposal areas according to grade using radiometric scanners and could the disposal areas be surveyed to facilitate future location?

Land Use

Post-reclamation land use was used as the common denominator to develop the reclamation objectives; however, the DEIS does not provide any information on the pre-mining land uses of the site or an assessment of the impacts on post-reclamation land uses for the reclamation alternatives. This information and analysis is needed to enable the Pueblo to establish post-reclamation land uses and to evaluate how thoroughly the alternatives would reclaim the site. Issues that should be addressed for each of the reclamation alternatives are as follows:

1. What post-reclamation land uses would be inappropriate or unacceptable?
2. What types of land uses would be unacceptable for the areas underlain by underground mine workings? Where are these areas located and how many acres are involved?
3. What impact on the value of the site as a future industrial complex would be caused by the removal of the buildings?
4. What impact on the value of the site as a future industrial complex would be caused by the removal of the rail spur?

15-28

15-28(Cont.)

5. How does the post-reclamation value of the site compare with the value of similar but undisturbed land?
6. What were the pre-mining land uses of the site?
7. What type of institutional controls will be required to regulate post-reclamation use of the site?
8. For what length of time will the proposed post-reclamation land uses be viable? For example, how long will the open pits provide vegetation for grazing before the buildup of surface salts destroys the vegetation?

The EIS should include a discussion of each of the issues identified above, as well as a quantitative assessment of the impacts on land values for each of the reclamation alternatives.

Revegetation

15-29

The DEIS does not contain sufficient information on the vegetation reference sites to enable the reader to determine if these sites are representative of undisturbed land. The location and composition of the reference sites should be provided in the DEIS. Are the reference sites located on the mesa tops, or in the more productive valleys? Have the reference sites been disturbed or overgrazed?

15-30

Page 2-72 states that the reclaimed sites are compared to "an average reference site." The DEIS should provide data to define the "average

15-30
(Cont.)

reference site" and should evaluate the reference sites to verify that they are representative of the area.

15-31

The data in Table 2-35 shows that none of the reclaimed waste dumps have reached ninety percent (90%) or greater of the basal cover of the reference sites, and only two sites have reached seventy percent (70%) or greater. The data also shows that the vegetation on dumps C, D, E, F, G, I, X, and Y-2 regressed between 1981 and 1982, approximately 5 years after planting. Despite this data, the DOI has proposed 5 years as an adequate duration to monitor revegetation success. The available data does not appear to support a monitoring period of only 5 years.

15-32

The results of vegetation surveys for 1983, 1984, and 1985 should be included in the DEIS.

15-33

Page 3-40 states that, "reclamation trials at the Jackpile-Paguate uranium mine have demonstrated that techniques . . . can successfully revegetate disturbed areas." As discussed above and shown in Table 2-35, the available data does not support this statement. In addition, all revegetation trials on the dump slopes, including trials with biodegradable matting, have been completely unsuccessful.

15-34

Page 3-40 states that under the applicant's proposal "all disturbed areas would be revegetated to approximate the species density and diversity of the surrounding terrain." However, the applicant's proposal is to ensure that the vegetation cover attains only seventy percent (70%) of the reference areas and

15-34
(Cont.)

this seventy percent (70%) does not "approximate the species density and diversity of the surrounding terrain." The phrases in quotations should be reworded.

The DOI should compare the revegetation success with precipitation data for the mine area to assure that the limited revegetation success is not due to periods of above-normal precipitation.

The DEIS should discuss the number, type, and location of the trees that will be planted at the site.

Fencing

As with any large industrial complex, it is the operator's responsibility to make a reasonable effort to prevent unauthorized access and the operator is liable for any damage or injuries that are due to the operator's failure to make such efforts. The mine has only been partially fenced and Anaconda does not propose to fence the site during reclamation.

15-35

Neither the Pueblo nor individual members of the Pueblo can accept responsibility for livestock that wanders from open grazing land into the unfenced mine site and graze on recently revegetated areas. The Pueblo has offered to assist the applicant in preventing livestock access by informing members of the Pueblo who graze livestock adjacent to the mine of the grazing restrictions on the mine site, and of the severity of the damage that could be caused to recently revegetated dumps. This offer exceeds the Pueblo's responsibilities and is representative of their efforts to assist in the reclamation of the site whenever possible.

The absence of fencing around major portions of the site also makes it extremely easy for children to gain access to the site where they may come into contact with hazardous conditions, such as unstable highwalls, open mine entries, and contaminated water. While fencing of the site would not preclude unauthorized access, it does provide a warning that access is not permitted, and that hazards exist.

The DOI should require the applicant to fence the entire mine site, except where mesa slopes preclude access. Warning signs should also be placed on the fence. The DOI should also advise the applicant that it is their responsibility to prevent livestock from grazing on the site, and that if grazing does occur it will not be sufficient cause to release Anaconda from the requirement of obtaining an appropriate vegetative cover.

Table 1-3 states that reclamation will be considered complete "if livestock grazing occurred on any revegetated area" regardless of how successful the revegetation program was at the time that grazing occurred. This stipulation is completely unacceptable:

Disposition of Rail Spur

The applicant has no established right to dispose of the rail spur ballast material at the mine site. The majority of the rail spur is located off of the mining leases and the construction and use of the rail spur are governed under separate agreements with the Pueblo. If the rail spur is removed, the Pueblo may not wish to have the ballast disposed of at the mine or on the reservation.

The DOI alternatives should be modified to include leaving the rail spur in place after the removal of the Quirk loading dock and the cleanup of the contaminated areas.

Sociological Impacts

The sociological impacts on the Laguna people have been treated in an unsatisfactory manner in the DEIS.

15-36 Under the schedules identified in the DEIS, reclamation would be conducted over a three-year period. This would require the hiring and subsequent dismissal of a large work force during this period. The resulting impacts would be the creation of a short-term, boom-bust cycle which would have a severe impact on social services, housing, economic structure, and transportation networks. These impacts are not addressed in the DEIS nor are ways to mitigate these impacts.

15-37 The DEIS also does not contain adequate sociological baseline data on population distribution, social structure, community services, work force, or housing availability.

15-38 The DEIS does not discuss whether members of the Pueblo will be given preferential hiring for the reclamation operations. The percentage of the employees hired from the Pueblo should be estimated.

15-39 It may be necessary to require that reclamation be conducted over a longer time period in order to reduce the impacts on social structures, community services, economic structure and social services.

Air Quality

15-40

The DEIS does not assess the impacts on air quality during the reclamation operations and does not discuss measures to mitigate these impacts. The high level of truck traffic and blasting during reclamation will release pollutants, principally particulates, which could impact the health and welfare of the people living in Paguate. Since reclamation operations may be performed at a rapid rate, it is likely that Federal standards may be exceeded during reclamation (AMC, 1979). To mitigate these impacts, it may be necessary to conduct reclamation over a greater period of time and use water or chemical suppressants on haul roads to reduce particulate releases.

The sampling frequency for total suspended particulates should be modified to be consistent with Federal requirements to allow for a direct comparison to Federal standards.

REFERENCES

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- ANL (Argonne National Laboratory), 1981. Radiological Impacts of Jackpile-Paguate Uranium Mines, prepared for the U.S. Department of Interior, U.S. Bureau of Land Management, Albuquerque, New Mexico.
- DOI (U.S. Department of Interior), 1985. Comments provided at the September 10 and 11 public hearings on the Jackpile-Paguate Draft Environmental Impact Statement, U.S. Bureau of Land Management, Albuquerque, New Mexico.
- DOI (U.S. Department of Interior), 1984. Preliminary Draft Environmental Impact Statement for the Reclamation of the Jackpile-Paguate Uranium Mine Reclamation Project.
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**COMMENTS
ON
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
ON
THE RECLAMATION
OF
THE JACKPILE-PAGUATE URANIUM MINE**

BY

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October 1, 1985

PUEBLO OF LAGUNA
Comments
on the Draft Environmental Impact Statement
on the Reclamation of the Jackpile-Paguate Uranium Mine

October 4, 1985

Prepared by
Nordhaus, Haltom, Taylor & Taradash

**Comments on the Legal Obligation
of the Department of Interior to Determine
the Proper Level of Reclamation of the
Jackpile-Paguate Uranium Mine**

The Pueblo of Laguna is in complete agreement with the analysis contained in the DEIS concerning the roles of the federal trust responsibility and NEPA in determining the level of reclamation for the Jackpile-Paguate uranium mine.

15-42 In addition to the obligatory contractual language contained in the leases and the federal regulations which require that reclamation be performed by the leaseholder, it should also be noted that the Secretary of the Interior is inescapably obligated to follow the mandates of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C.A. 4321, et seq., and the concomitant federal regulations, Title 40 Part 1500, et seq.. Indeed, absent specific reclamation regulations for non-coal surface mining, the NEPA process is the only method by which the responsible decisionmaker can select a reclamation alternative which in his judgment is in the best interest of the Pueblo of Laguna and fulfills the federal trust responsibility. The applicability of NEPA to Indian lands is no longer in question. Davis v. Morton, 469 F.2d 593 (10th Cir. 1972); Cady v. Morton, 527 F.2d 786 (9th Cir. 1975).

The DEIS acknowledges disagreement among the involved parties as to the applicability of some of the regulations to certain leases due to the fact that some of the applicable regulations post-date the effective date of the three mining leases involved.

To the extent there is any ambiguity as to the extent of the obligation, it must be presumed that because of the trust relationship, reclamation is required to be performed to the fullest extent to eliminate all health and safety hazards. The

DEIS has recognized and comprehensively addressed the public health and safety hazards. For Anaconda to argue that its obligations are limited due to the non-existence of reclamation regulations at the time mining commenced requires Anaconda to ignore certain provisions of the lease agreements. Specifically, the leases of March 27, 1952 and July 24, 1963 require Anaconda "to abide by and conform to" those regulations of the Secretary of the Interior which were in existence at the time the leases were entered into and those which were promulgated during the lease term.

Anaconda has suggested that it is required to comply only with those regulations which were in place on March 27, 1952. This position ignores the clear language of the lease agreements and rather ludicrously supposes that once the first shovel of dirt was turned by Anaconda on the leased premises that its mining procedure was carved in stone and Anaconda's obligation to reclaim, or lack thereof, was "locked in". Anaconda would have the involved parties hereto believe that it mined for thirty years with an extremely limited reclamation obligation.

Anaconda's subreptitious statement of its reclamation obligations ignores the federal trust responsibility and NEPA. NEPA has been in existence for sixteen years and was enacted to enable proper decisionmaking in any major federal action. The reclamation decisions of the federal government required by the leases and regulations constitute such major federal action significantly affecting the human environment.

The Pueblo continues to object to one puzzling aspect of the DEIS. At page 1-5 under the heading "Scope of the EIS" it is stated that "[i]t is not within the scope of this EIS to discuss past impacts to the environment during mining

15-43(Cont.)

activity." The scope of the EIS is alleged to be the reclamation of the Jackpile-Paguate uranium mine and the affected adjacent areas. Since it is the past mining activity which gives rise to the need to reclaim, then it becomes impossible not to assess the past impacts to the environment during the mining period in reaching a decision as to how reclamation should occur. In other words, had there been no past impacts to the environment during mining activity, there would be no need to reclaim. Thus, the assessment of past impacts to the environment becomes critical to a lucid decision as to what reclamation activity is warranted. Public comments indicate strong concern over past impacts of mining on the residents of the Pueblo, structures in the Village of Paguate and downstream water quality.

15-44

Consequently, the issues dropped from further evaluation as identified on pp. 1-7 through 1-8 of the DEIS concerning damage to the Village of Paguate, siltation of Mesita (Quirk) Reservoir and health effects on Paguate villagers must be considered and incorporated into the final EIS as discussed in greater detail in the associated documents.

Renee A. Paisano
5801 Cambria N.W.
Albuquerque, New Mexico 87120

October 4, 1985

Mr. Mike Pool
EIS Team Leader
U.S. Department of the Interior
Bureau of Land Management
Rio Puerco Resource Area
3550 Pan American Freeway, NE
Albuquerque, New Mexico 87197-6770

Dear Mr. Pool:

Mr. Pool and members of the EIS Team, I put before you a few concerns and comments with regard to the Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project located on the Laguna Indian Reservation. The comments expressed here are of great concern to myself, as a member of the Laguna Tribe, and my family; some of which live currently near the affected area.

Aside from the obvious concerns of all people involved in the public health and safety hazards directly associated with the open mine pits, my concerns focus mainly on the unresolved question of how Laguna must begin proper reclamation of the mine and the development of a sufficient proposal that would alleviate all health and safety hazards. My first concern is that my people suffer no long term damage to health, home or environment and to insure the prosperity of future generations to come. Ironically, while people in the affected area are at great risk, these same people are most uninformed about what lies ahead for them unless a proper reclamation is initiated. I have been most troubled by this lack of information to the community involved and also the draft statement that was provided me. For those individuals who did manage to get ahold of the EIS, such as myself, a myriad of questions and confusions arise because of the obscure way in which the report is presented. This tends to frustrate and discourage rather than properly educate and inform people of the problem at hand. I wonder then what purpose the EIS is supposed to serve.

In short, I am dissatisfied with the EIS as a whole and the proposals provided. It is my suggestion and the suggestion of my family, that extensive research on the part of the tribe be conducted, with the input of the community to be affected, to develop a sufficient proposal. I strongly believe that the welfare of the Laguna Indian people and those people living within the immediate vicinity should override the concern for budget limitations and projected cost factors.

Sincerely,

Renee A. Paisano
Renee A. Paisano



American Indian Environmental Council
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 Casa Blanca, NM 87007

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INDIAN HEALTH AND RADIATION PROJECT

SHE provided us with plenty - we only took what we needed and we prayed

October 1, 1985

Bureau of Land Management
 Albuquerque District Office
 PO Box 6770
 Albuquerque, NM 87197-6770

Please accept these comments on behalf of the Indian Health and Radiation Project of the American Indian Environmental Council, Inc.

I did not get to attend the public hearings and I would like to express my support of the alternative presented by the Pueblo of Laguna, except for certain points brought out in my comments below.

Section: History and Background

17-1 I find it very difficult to believe that neither the Pueblo of Laguna or Anaconda ever recorded what the 2,656 disturbed acres looked like before mining.

17-2 Within the same section of the DEIS, why was there not an accurate record of exploration holes drilled?

17-2 Pg. 1-4 Paragraph 2 - "Additional acreage (unquantified) was disturbed by the drilling of exploration holes." Can't these holes pose a danger to livestock and other animals in the area?

17-3 Pg. 1-5, Paragraph 5 - "The scope of the EIS is the reclamation (restoration to productive use) of the Jackpile-Pauguate uranium mine and the affected adjacent areas. It is not within the scope of the EIS to discuss past impacts to the environment during mining activity."

17-3 Whose decision was it not include discussion of past impacts in the DEIS? It would seem to me that in order to better understand, not necessarily, conclusively, the health effects of radiation, one would look at the past experiences in the area. I interpret this paragraph and the entire approach of ignoring past impacts as a blatant and evasive tactic by all parties involved to disregard and disrespect the health and general welfare of all life forms within a 50 mile radius. At best, DOI, Pueblo of Laguna and Anaconda should commission a study of past impacts caused by mining. I think the parties responsible for the mining operations should look at the medical studies being conducted in the Four corners area and in Arizona, in areas

Page 1-4, Paragraph 4 - "The lease terms and regulations give the DOI the most appropriate reclamation procedures, but they do not contain specific goals or standards to guide the DOI's decision. Therefore, the DOI must consider various reclamation alternatives, and choose the one that is considered to be the most appropriate."

I find it ironic that DOI submitted an alternative and then has the authority to select any of the alternatives, without specific goals or standards. It is much like the fox guarding the henhouse.

Page 1-5, Paragraph 7 - "Due to the governing regulations ..."

17-4 I think the statement is very paternalistic in its application. The affected people, rather than DOI, should determine the level of reclamation. After all, the people have been here for centuries and know the workings of the land, whereas DOI has only been in existence since the 1800's. The paragraph is misleading also in that Laguna Pueblo residents are not the only affected/impaired Indian population. There are Navajo (Canoncito), Acoma, Jemez, Zuni, Santa Ana, Zia etc who all within a fifty mile radius from the site. How does DOI interpret its responsibility to these other groups? The concern arises, too, from this paragraph that DOI should not be specifically concerned with the level of reclamation, but of what the very best type of reclamation should be. After all, we are discussing the general health and welfare of over 7000 people just in the Laguna area alone. Finally, I think DOI owes Indian people its very best efforts with this project because, in my opinion, they abused their trust responsibility when they "allowed" the mining operations to begin in the 1950's. DOI did properly advise tribal entities about known health risks and potential economic instability by encouraging a dependence on a capital intensive business, such as uranium mining. For these reasons, alone, the Tribe should never allowed mining to begin again.

17-5 Page 1-6, entire section - Authorizing Actions - I find this section beyond average comprehension. Of all the responsible parties, who is responsible for the health and safety of humans in the area. Is BLM in its responsibility "for preparing any corresponding environmental documentation that would be required", planning to document known health impacts to local residents?

17-6 No where in this section is there mention of what Anaconda's responsibility is. Instead the state and federal government is bearing sole responsibility for the Jackpile, of which Anaconda, its corporate officers and stockholders pocketed millions of dollars.

17-7 Page 1-7, Issues Dropped From Further Evaluation - It appears that any issue which might have resulted in possible litigation was dropped from the EIS. Who determined the scope of the EIS? These issues also appear to be issues the "average" local resident is concerned about, yet they were dropped from analysis.

17-8 Page 1-8 #7 - The Jackpile project is to be a precedent setting project. There never has been the reclamation of a uranium mine in New Mexico, much less on Indian land. This project could have had the potential to influence national standards in a good way.

Page 1-9, #9 - I believe the socio-economic impacts are greater than involved parties care to admit. The DEIS has failed to adequately involve other communities impacted by the Jackpile Mine, i.e. the Spanish Land Grants.

Also, I believe Laguna Pueblo has set a dangerous example to young Indian people regarding the value of land which is contrary to the traditional views.

17-9 | Page 1-9 #3 - What the references for this related to the cost of backfilling? If complete backfilling is unnecessary, what will BLM and DOI do in the event that sink holes begin to occur. Many places on the Navajo reservation who had mining (coal and uranium) now have this problem. As a result, families have had to move after a sink hole appeared endangering their families and destroying corrals and homes.

17-10 | Page 1-10, Alternatives Selected for Detailed Study, #1 - The reclamation objectives are commendable, but I fail to understand how you can accomplish objective #1 "Ensure human health and safety." How are involved parties separating health and human impacts of 30 years past from impacts during reclamation and proposed monitoring period. Has there been monitoring of human health up to this point? Is there a plan or study to be utilized during reclamation and post reclamation to measure impacts to human health? And, should people living within a 50 mile radius feel their health and family's health has been damaged as a result of Jackpile mining activity, what compensation will they receive, if any? Or would this set an expensive precedent for energy corporations and the government?

17-11 | Page 2-1, Mining operations, Paragraph 4 - How many ventilation holes were made?

17-12 | Page 2-1, Mining Operations, Paragraph 6 - How radioactive is this backfill material, percentage wise of the original material?

17-13 | Page 2-2, Table 2-1 Principal Features of Interest in Area of Jackpile-Paguete Uranium Mine - What is the definition of "principle interest?" Are there not the nearby communities of Seboyeta, Bibo and Moquino of principle interest? They're just north of Paguete and have felt all the impacts from the Jackpile operations.

17-14 | Page 2-15, Table 2-7 - The figures for "Anaconda's Environmental Monitoring Program" should be printed.

17-15 | Page 2-26, Underground Openings - The number of underground openings/pits should be listed, their location, depth, and length. This would be important in preventing animal and human accidents.

17-16 | Page 2-27 Sources of Radiation at the Minesite, Paragraph 3 - I am concerned about the possibility of "radioactive rain", is this realistic to assume that of radioactivity evaporates with the water, that it will return in the rain?

17-17 | Page 2-65, Air Quality - "No pre-mining data are available." State

17-17 (Cont.) ments like this throughout the entire DEIS bother me. I cannot believe that a huge multi national corporation like Anaconda or Atlantic Richfield did not assemble data on pre-mining conditions.

17-18 Page 2-77, Cultural Resources - "Of this total, 205 remain. Seven of the sites were excavated and five were formally determined to be insignificant..." This statement is upsetting. All these sites mean something to Indian people. Whose determination was it that these sites were insignificant?
I think that involved should consider doing or printing a cultural resources inventory.

17-19 Page 2-76, Table 2-36, Reclaimed site Vegetation Analysis - I may be mis-reading this table, but how does the reader figure if plant chemical uptake has increased based on the data given in this table?

17-20 Page 3-1, Blasting During Reclamation - I am totally opposed to any blasting, especially since no where in the DEIS is it discussed if any financial compensation will be offered persons suffering from impacts of reclamation plans. Blasting is a "fast, easy" way to deal with Jackpile pit highwall or construction of the Jackpile pit drainage channel.

17-21 Page 3-2, a., b., 3. 4 - I do not think the Jackpile Mine should be used as a testing site to determine if blasting is damaging or not. If involved parties don't know the extent of damage, then blasting should not be done.
There isn't any analysis in this DEIS of the potential impacts to underground water systems or underground mine sites. How would blasting possibly damage natural rock formations, would it create further ground instability leading to damages in the homes of local residents? How would the blasting effect plants and animals? What about religious sites and other cultural resources?
Do responsible parties have money to compensate local residents for damages done by blasting?

Page 3-12, Radiation - Involved parties should commission a study through the Indian Health Service to study specific health problems known to result from long term radiation exposure. Again, I still cannot see how the past 30 years of radiation exposure to humans can be separated from current plans.

17-22 Page 4-2, March 16, 1981 meeting - How can Laguna Pueblo, Anaconda, DOI, BLM ignore the concerns of people, especially when they were expressed already in 1981. Do the involved parties plan to study the damage already done by the mining as it relates to human health?

Page 4-10, Table 4-2 Consultants and Contributors - Why were medical doctors, perhaps from Indian Health Service not involved as consultants and contributors?

Summary - All the alternatives have negative aspects to them, but, overall the Laguna alternative is adequate because of its longer post

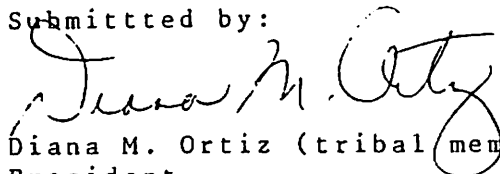
reclamation monitoring period, thereby creating jobs for local people for a longer period of time. And in its details, hopefully, contains more of a native approach and perspective. I, am, however, opposed to any blasting.

I feel, also, somewhere Indian Health Service needs to be consulted and involved with the health crisis radiation exposure is creating in the communities of Paguate, Seboyeta, Bibo and Moquino.

Also, I think the involved parties need to come up with a comprehensive health plan for reclamation personnel exposed to radiation.

Whatever ore reserves remain should not be mined. The legal, political, socioeconomic and spiritual costs are too high and Indian people never come out "on top" when bargaining with these large corporations who usually have the support of the federal government.

Submitted by:



Diana M. Ortiz (tribal member of Acoma Pueblo)
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SIERRA CLUB

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October 4, 1984

Mike Pool
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P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool;

On behalf of the 3500 Sierra Club members in New Mexico, who are concerned about the environmental quality of all portions of our state, I have reviewed the Draft EIS, Jackpile-Paguate Uranium Mine Reclamation Project, and I submit the following comments for the public record.

We strongly support the stated primary goal of the project to reclaim and stabilize the minesite to productive use of the land, and to ensure that adverse environmental impacts are reduced to the extent possible. We would add explicitly what is implied, that the minesite should be reclaimed and stabilized for the long term, to prevent excession and/or unnatural erosion, and to protect air and water quality. Further, we endorse the reclamation objectives which appear on page 1-10, and urge you to select an alternative which most fully realizes these objectives. To this end, the best alternatives are the DOI alternatives and the Laguna alternative. These three alternatives propose desirable improvements to the Anaconda proposal of 1982 which is reviewed in the DEIS.

18-1 The most recent, minimal reclamation proposal of Anaconda would not appear to adequately stabilize the land, slow erosion, protect surface water quality or groundwater quality to the extent possible over the long term, nor return the land adequately to productive use. If your professionals concur in this judgement we would urge you to respond to the 1985 proposal of Anaconda as appropriate in the final EIS, use additional information acquired during the public comment period to improve and strengthen your proposed plan, but not to delay further the time when implementation of this plan can begin.

At the public hearing, Anaconda stated that they found the DEIS inadequate, and suggested that a new DEIS should be issued. We disagree. Disagreements will always exist among professionals about the "best" way to reclaim land, and the ultimate consequences of a decision. The role of the DOI should be to gather as much information as possible, from whatever sources are available, and then proceed to a decision and action.

Thank you for the opportunity to review this DEIS.

Sincerely,

Phyllenore D. Howard

Phyllenore D. Howard, Ph.D.

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JOHN F. SHEPHERD

October 4, 1985

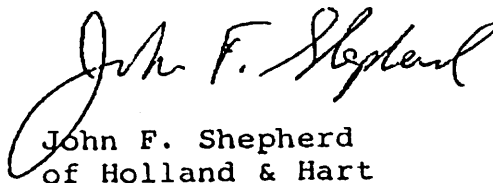
Mike Pool (EIS Team Leader)
USDI-Bureau of Land Management
3550 Pan American Freeway, NE
P.O. Box 6770
Albuquerque, New Mexico 87197-6770

Re: Comments on Draft EIS for Jackpile-Paguate
Reclamation Project

Dear Mr. Pool:

During the hearings held on September 10 and 11, 1985, the attorneys for the Pueblo of Laguna testified regarding their interpretation of Anaconda Minerals Company's legal obligations to reclaim the Jackpile-Paguate mine. Attached is Anaconda's response to their testimony.

Sincerely,


John F. Shepherd
of Holland & Hart

JFS:slp

RESPONSE OF THE ANACONDA MINERALS COMPANY TO TESTIMONY OF
ATTORNEYS FOR THE PUEBLO OF LAGUNA

October 4, 1985

At the hearings on the Draft Environmental Impact Statement held on September 10 and 11, 1985, Mr. Les Taylor and Mr. B. Reid Halton, attorneys for the Pueblo of Laguna, gave their interpretation of the extent of Anaconda's legal obligations to reclaim the Jackpile-Paguate mine. Our preliminary comments dated August 16, 1985 (at pages 4-8) set forth Anaconda's position and readily refute most of what the Laguna's attorneys contend. This response will briefly address a few points not specifically discussed in our preliminary comments.

I. 25 C.F.R. Part 216 Does Not Apply.

The Laguna's attorneys argue that the Bureau of Indian affairs' reclamation regulations, 25 C.F.R. Part 216, apply to Anaconda's mining operations on the 1952 and 1963 leases. As we pointed out in our preliminary comments, 25 C.F.R. Part 216 applies "only to permits or leases issued subsequent to the date on which these regulations become effective." 25 C.F.R. § 216.2(c). The Part 216 regulations, then codified as 25 C.F.R. Part 177, became effective on January 18, 1969 (34 Fed. Reg. 813). The leases were issued in 1952 and 1963. Therefore, 25 C.F.R. Part 216 does not apply.

Despite the clear language in 25 C.F.R. § 216.2(c) making Part 216 applicable only to leases issued after January 18, 1969, the Laguna's attorneys argue that a provision in the 1952

and 1963 leases that the lessee shall comply with all regulations of the Secretary of the Interior "now or hereafter in force relative to such leases" makes Part 216 applicable. In other words, they contend that this lease clause overrides the specific language in § 216.2(c). This tortured interpretation is incorrect for two very simple reasons.

First, the lease clause refers to regulations "now or hereafter in force relative to such leases." (Emphasis added.) Not all subsequently adopted federal regulations apply to the leases; only those "relative" to the leases apply. Since § 216.2(c) provides that Part 216 does not apply to leases issued prior to January 18, 1969, Part 216 is not in force "relative to such leases." The Laguna's argument to the contrary is akin to arguing that regulations governing reclamation of coal leases apply to Anaconda's uranium leases. By their very terms, the Part 216 regulations do not apply to the 1952 and 1969 leases, just as coal mining regulations do not apply to uranium leases.

Second, if the Laguna's argument were correct, Part 216 would be retroactively applied to all Indian mineral leases and § 216.2(c) would be effectively read out of the regulations. This is because the clause requiring the lessee to comply with all regulations of the Secretary of the Interior "now or hereafter in force relative to such leases" is a standard clause inserted in all mineral lease forms used by the Department. To interpret that clause as overriding § 216.2(c) would defeat the

intent of the Secretary not to make those reclamation regulations applicable to existing leases. It would also render § 216.2(c) mere surplusage, thus violating the well-established rule of construction that "a statute [or regulation] should be construed so that effect is given to all its provisions, so that no part will be inoperative or superfluous, void or insignificant...." 2A Sutherland Statutory Construction § 46.06 at 104 (4th Ed.).

The Laguna's attorneys also contend that "Anaconda ignores the fact that Part 216 superseded regulations which contained basically, if not exactly, the same requirements." Although the attorneys do not cite or describe these "superseded regulations," they apparently contend that the reclamation regulations now codified in 25 C.F.R. Part 216 were in effect at some point in the distant past, presumably when the leases were issued. In any event, whatever their argument, the reclamation regulations in Part 216 were first adopted on January 18, 1969 and codified as 25 C.F.R. Part 177. 34 Fed. Reg. 813. These were the first reclamation regulations promulgated by the Secretary for mining operations on Indian lands and they contained the identical language now codified in 25 C.F.R. § 216.2(c) making them applicable only to leases issued after January 18, 1969. See 34 Fed. Reg. 814, codified as 25 C.F.R. § 177.2(c). Consequently, neither 25 C.F.R. Part 216 nor its predecessor, 25 C.F.R. Part 177, apply to the 1952 and 1963 leases.

II. The Lease Provisions do not Require Reclamation Beyond Eliminating Unreasonable Hazards to Human Health or Safety.

The Laguna's attorneys also quote a number of the provisions in the 1952 and 1963 leases. They do not explain their interpretation of these provisions, but imply they should be expansively interpreted to require extensive reclamation. Our August 16, 1985 preliminary comments discuss the interpretation of these provisions and explain why they do not require Anaconda to perform reclamation beyond ensuring that the mine site does not pose an unreasonable hazard to human health and safety. Briefly stated, the interpretation of these provisions is governed by the intent of the parties and the custom and usage of the industry at the time they were executed. There is no evidence that the parties contemplated reclamation under these terms, and the custom in the industry was that such provisions did not encompass reclamation.

The fact that the Secretary of the Interior decided to adopt specific reclamation regulations in 1969 (now 25 C.F.R. Part 216) confirms this conclusion. If the Laguna's attorneys' interpretation of the leases were correct, there would have been no reason for the Secretary to adopt those regulations. That the Secretary made these reclamation regulations applicable only to leases issued after January 18, 1969 also shows that the Secretary recognized the unfairness in making such costly requirements retroactive to existing leases.

III. NEPA Does Not Give the Secretary Power to Require Reclamation.

The Laguna's attorneys' argument regarding the National Environmental Policy Act (NEPA) is confusing. Anaconda does not dispute the applicability of NEPA. Indeed, it contends that the draft EIS fails to comply with NEPA eliminating the no-action alternative and in not considering any other alternative less extensive than the "Green Book" proposal.

If the Laguna's attorneys are contending, however, that NEPA gives the Secretary power to require reclamation beyond the terms of the leases and applicable regulations, they are mistaken. The Supreme Court has held that NEPA does not confer any substantive power on federal agencies or courts. It is a procedural statute only. Strycker's Bay Neighborhood Council v. Karlen, 444 U.S. 223 (1980). Thus, Anaconda's reclamation obligations are determined and limited by the terms of the leases and applicable regulations.

IV. Regulations of the NRC or State Agencies Do Not Apply.

Finally, during his testimony Mr. Halton made a vague reference to regulations of the Nuclear Regulatory Commission (NRC) and the New Mexico State agencies. However, there are no NRC or State regulations that apply to reclamation of the Jackpile-Paguate mine, which probably explains why Mr. Halton did not cite any.

ANACONDA Minerals Company
New Mexico Operations
P.O. Box 638
Grants, New Mexico 87020
Telephone 505 876 2211



October 3, 1985

Mr. Mike Pool
EIS Team Leader
Bureau of Land Management
3550 Pan American Freeway, N.E.
P. O. Box 6770
Albuquerque N.M. 87197-6770

Dear Mr. Pool:

Enclosed are 5 copies each of the following documents:

1. Review of the Radiation Impact Analysis in the Jackpile-Paguate Uranium Mine Reclamation Project, September 1985, L. D. Hamilton, M.D., Ph.D.
2. Evaluation of Radiological Source Terms and Reduction of Releases by Cover for the Jackpile-Paguate Uranium Mines, September 1985, Lyda W. Hersloff, Ph.D.
3. Review of the Radiological Impact, Analysis of the Jackpile-Paguate Uranium Mine Reclamation Project, September 1985, Senes Consultants Limited.
4. 1985 Jackpile/Paguate Reclamation Alternatives, September 1985, Morrison-Knudsen.
5. 1985 Multiple Land Use Reclamation Plan, (Materials Movement), September 1985, Morrison-Knudsen.
6. Jackpile Mine Floodway Analysis, September 25, 1985, Morrison-Knudsen.
7. Stability Reevaluation, Jackpile Highwall and Waste Dumps, Jackpile-Paguate Uranium Mine, Cibola County, New Mexico, May 1985, Seegmiller International.
8. Stability Reevaluation Selected Waste Dumps, Jackpile-Paguate Uranium Mine, Cibola County, New Mexico, July 1985, Seegmiller International.
9. Groundwater Effects on the North Paguate Pit Stability, Jackpile-Paguate Uranium Mine, Cibola County, New Mexico, July 1985, Seegmiller International.
10. Revegetation Components of Anaconda's 1985 Multiple Land Use Reclamation Plan, September 1985, Stoecker, Keammerer and Associates.

11. Evaluation of the Community Structure Analysis Method Regarding Its Possible Use on the Jackpile-Paguate Mine Site, September 1985, Stoecker, Keammerer and Associates.
12. Water Quality and Salt Balance Estimates, Proposed Reservoir in North Paguate Pit, Jackpile-Paguate Uranium Mine for Anaconda Minerals Company, September 25, 1985, Dames and Moore.
13. Water and Salt Balance Estimates Evaluations of Hydrologic Effects Jackpile-Paguate Uranium Mine for Anaconda Minerals Company, September 25, 1985, Dames and Moore.
14. 1985 Multiple Land Use Reclamation Plan, September 1985, Anaconda Minerals Company.

Documents 1-13 are reports by consultants employed by Anaconda and form the basis of the respective statements made by these consultants at the 10-11 September 1985 public hearings and contained in Anaconda's Preliminary Comments on the Draft EIS which we submitted on 16 August 1985.

Please include these documents into the Jackpile-Paguate Reclamation project hearing record and accept the enclosed edition of the 1985 Multiple Land Use Reclamation Plan as Anaconda's proposed reclamation plan. We also request the documentation identified as: Preliminary Comments on Jackpile-Paguate Uranium Mine Reclamation Project Draft EIS, dated August 16, 1985 and signed by Charles B. Smith, Vice President, Anaconda Minerals Company (one copy enclosed), be included in the EIS record. We will be happy to answer any questions you may have regarding these enclosed reports and plan.

Anaconda's position remains that the draft EIS be withdrawn and rewritten to include consideration of at least the no action alternative and Anaconda's 1985 Multiple Land Use Reclamation Plan as reasonable alternatives. The rewritten draft statement must also correct the significant errors identified by Anaconda in our preliminary comments submitted 16 August 1985. The corrected draft statement should then be reissued for public comment.

Please contact me if you have questions regarding this matter.

Sincerely,

Mead A. Stirland

Mead A. Stirland
General Manager

mls

cc: Governor Chester Fernando (5 copies)
Charles B. Smith w/o Enclosures

701 'E' Street
Silver City, New Mexico
88061

October 3, 1985

Mr. Mike Pool, EIS Team Leader
Bureau of Land Management
U.S. Department of Interior
P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool:

Please consider the following comments concerning the Jackpile-Paquate Uranium Mine Reclamation Draft Environmental Impact Statement which comments are submitted by the October 4, 1985 deadline.

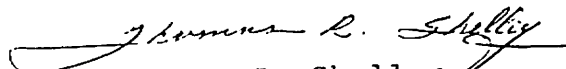
It is an utter waste of money to spend 55 to 57 million dollars to reclaim this mine, which I drive past frequently in my work as professional engineer and land manager for the neighboring L-Bar ranch.

It would be far more beneficial to isolate and monitor the site, do as little reclamation work as is absolutely dictated to protect human health and request congressional and executive authorization to purchase ten or fifteen times as much land for the Indians as has been disturbed.

The present plan is burdensome, totally non-productive and an utter waste of human and financial resources.

Thank you for considering these comments.

Yours very truly,


Thomas R. Shelley

cc: New Mexico Congressional Delegation



**UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**

Field Supervisor
Ecological Services, USFWS
Post Office Box 4487
Albuquerque, New Mexico 87196

October 3, 1985

Memorandum

To: Regional Director, Bureau of Land Management,
Attn: Mike Pool, EIS Team Leader, Albuquerque,
New Mexico

From: Assistant Field Supervisor, FWS, Ecological Services,
Albuquerque, New Mexico

Subject: Draft Environmental Impact Statement (DEIS),
Jackpile Paguate Uranium Mine Reclamation Project,
Laguna Indian Reservation, Cibola County, New Mexico

This memorandum provides our review of the subject (DEIS) for reclamation of the Jackpile-Paguate uranium mine. The mine is located within the Laguna Indian Reservation about 40 miles west of Albuquerque. A total of 2,656 acres of surface disturbance resulted from mining. The area encompassed a lease site of 7,868 acres and included three open pits, 32 waste dumps, 23 protore (sub-grade ore) stockpiles, four topsoil stockpiles and 66 acres of building and roads. The DEIS describes four alternatives for reclamation; (1) no-action (2) Anaconda's (3) DOI's and (4) Laguna.

22-1 | The DEIS does not mention any potential contamination of either ground or surface water as a result of leachate of heavy metals, particularly selenium from unprocessed ore. We note that in the area near Grants, high values of selenium have been found during analysis of uranium bearing ore. We recommend that an analysis of the 23 protore stockpiles and the 32 waste dumps be included in the final EIS.


22-2 | The DEIS also does not provide enough emphasis on wildlife utilization of the reclaimed sites. We recommend that more emphasis be placed upon revegetation with forbs and woody species to increase plant diversity. Species similiar to those that occur on undisturbed sites could be utilized for reclamation.

22-3 | The major portion of reclamation for this site centers around how much backfill will be placed in the three open pits. All of the alternatives will utilize protore and waste dump material. There is no analysis provided concerning this backfill material nor is there any indication

22-3(Cont.) that pit bottoms will be sealed to prevent leachate from entering groundwater. The DEIS suggests that groundwater quality will degrade, however, no quantification is given for how much degradation will occur. This information specifically should be provided in the EIS. An analysis of surface water runoff from this site should also be included in the final EIS.

22-4 The proposed objective of this project is to reclaim this site for post mine use, in this case livestock grazing. The reclamation plan alternatives do not address the potential hazard that can result due to exposure to hazardous materials. The four proposed alternatives do not adequately evaluate the potential hazard to grazing livestock or wildlife in the event that heavy metal contamination existing in waste dumps or proture is concentrated in plant material. We recommend therefore, that an alternative to contain all solid wastes and liquids within the lease property be considered.

Thank you for the opportunity to comment on this DEIS. If you have any questions concerning our comments please contact Tom O'Brien at (505) 766-3966 or FTS 474-3966.


Michael J. Donahoo

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Health and Environment Department, Environmental
Improvement Division, Santa Fe, New Mexico
Regional Director, FWS, Habitat Resources, Albuquerque, New Mexico



United States Department of the Interior

NATIONAL PARK SERVICE

SOUTHWEST REGION

P.O. Box 728

Santa Fe, New Mexico 87501

IN REPLY REFER TO:

L7619(SWR-PE)

OCT 3 1985

Memorandum

To: District Manager, Bureau of Land Management, Albuquerque, New Mexico
Attention: Mike Pool, EIS Team Leader

From: Associate Regional Director, Planning and Cultural Resources,
Southwest Region

Subject: Review of Bureau of Land Management and Bureau of Indian Affairs
Draft Environmental Impact Statement for the Jackpile-Paguate Uranium
Mine Reclamation Project, Laguna Indian Tribal land, Cibola County,
New Mexico (DES 85/9)

We have reviewed the subject document and find that it adequately addresses
the concerns of this agency.

Elton D. Royer



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

OCT 04 1985

Mr. Mike Pool
EIS Team Leader
U.S. Department of the Interior
Bureau of Land Management
3550 Pan American Freeway, N.E.
P.O. Box 6770
Albuquerque, New Mexico 87197-6770

Dear Mr. Pool:

We have completed our review of your Draft Environmental Impact Statement (EIS) for the Jackpile-Paguate Uranium Mine Reclamation Project, Cibola County, New Mexico.

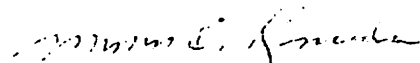
The reclamation proposal would restore the mine site to productive land use for livestock grazing, alleviate physical hazards, significantly reduce radiological impacts, blend the visual characteristics of the mine site with the surrounding lands, and provide employment.

We classify your Draft EIS as Lack of Objections (LO). Specifically, EPA has not identified potential environmental impacts requiring substantial changes to your agency's reclamation proposal. EPA recognizes that the existing mine site is presently a public health and safety hazard and additional hazards may develop if the site is not reclaimed. We support your efforts to develop appropriate mitigation as warranted to address and offset special concerns identified as a result of the ongoing draft review process. We ask that the mitigation plan be included in the Final Statement.

Our classification will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

We appreciate the opportunity to review the Draft EIS. Please send our office one (1) copy of the Final EIS at the same time it is sent to the Office of Federal Activities, U.S. Environmental Protection Agency, Washington, D.C.

Sincerely yours,


Dick Whittington, P.E.
Regional Administrator

TO THE DEIS PANEL:

First of all, I would like to thank the Panel for the opportunity to express my concerns on the proposed reclamation plan for the Jackpile Mine.

I had the opportunity to listen to Anaconda's presentation before the Panel and to be quite honest, I was very much surprised with the proposed reclamation plan that Anaconda would like to perform. As you heard during the Public Hearings, Anaconda made many promises to the Pueblo of Laguna that they are now reneging on.

We were told by our Elders of the Pueblo that one of these days, we would be fighting with Anaconda because the promises made at the onset of the mining operation were done by a "hand shake." Anaconda promised that they would reclaim the land disturbed by them back to as close to the original state as possible no matter what it took. We cannot let Anaconda walk away from the Pueblo doing very little as they now propose. I request that the Panel in its final EIS, require Anaconda to do the full scale reclamation effort as the Pueblo of Laguna has proposed. Anything below this level will not be sufficient and would only cause more environmental problems in the future, not only for the residents of the Pueblo but, also

for the surrounding communities.

I recommend that the following items be considered for the final Environmental Impact Statement:

1. The blasting damages done to the homes at Paguate Village needs to be addressed in the EIS.
2. The highwalls must be stabilized. At the present time, the highwalls are already beginning to deteriorate.
3. Anaconda should be required to at least begin some reclamation work. Fencing needs to be put up. The protore stockpiles need to be covered up. Erosion control needs to be implemented.
4. Radiation levels need to be brought down to safe levels.
5. With six reclamation plans withdrawn, does Anaconda really know what they want to do? That is why the Pueblo's plan should be utilized.
6. Long term monitoring needs to be included in the reclamation plan approved of. We need to make sure that the safety and health of all those concerned are protected now, and in the future.

7. Anaconda needs to keep their promise of backfilling the pits. They promised this to the Pueblo and Anaconda should not be freed from this promise.
8. The study done by Argonne National Laboratory should be used to determine the ground-water recovery levels. We need to make sure that the ground-water recovery levels are at a safe level.
9. All religious sites should not be disturbed.

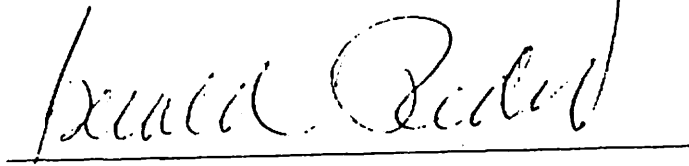
In closing, we cannot let Anaconda go away from the Pueblo without them fulfilling their promises. Plus, they should not be allowed to do the kind of reclamation work they plan to do. This would be very detrimental to the land and the People of the Pueblo and the surrounding communities. How can Anaconda have the audacity to propose developing a recreational site on the Pueblo!! They even have the audacity to call this their reclamation plan!!!!

A very strong plea goes to the Panel not to let Anaconda do very little. I do not want a recreational site as Anaconda proposes. I want the land restored back to as close to the original state as it was when Anaconda first set foot on this Pueblo. If Anaconda is not required to do full scale reclamation then, not only will the Pueblo of Laguna suffer but, other communities, cities and states will

be forced to endure the suffering brought on by big Oil, Gas and Uranium Companies. After all, Anaconda is not only fighting for their cause, it is very evident that they are looking after the interests of all other Oil, Gas and Uranium Companies in the United States.

If big companies are to reap their harvest then, they must take on the responsibilities of reclaiming the land they disturb for the benefit of future generations to come.

Thank you.


Gerald Pedro



Health Resources and Services
Administration
Rockville MD 20857

OCT 4 1985

Mr. Mike Pool
USDOI-Bureau of Land Management
3550 Pan American Freeway NE
P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool:

We appreciate the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the Jackpile-Paguate Uranium Mine Reclamation Project. Our review of the EIS has been concluded and we generally favor the alternative proposed by the Department of Interior (DOI). However, there are some elements of the Laguna proposal which we feel should be incorporated into the DOI proposal. The identification of these elements and other comments related to the EIS follow:

- 26-1 | 1. Page 1-8. The health impact to workers involved in the reclamation effort does not appear to have been one of the issues evaluated although it is mentioned in item 1. The data contained in the EIS are based upon static conditions which would not exist during reclamation efforts.
- 26-2 | 2. Page 1-8. Contamination of surface waters, but not ground water, is listed as an issue that was evaluated. Since contamination of ground water represents a potential long-term health problem, additional emphasis should be given to this issue.
- 26-3 | 3. Page 1-12. The DOI proposal states that the monitoring period would be of sufficient (emphasis added) duration to determine the stable future water table conditions. While it is realized that it may not be practical to estimate a specific time period, the language should be clear enough to avoid any differences of opinion that could possibly arise in the meaning of sufficient.
- 26-4 | 4. Page 1-12. The 10 year minimum post-reclamation monitoring period contained in the Laguna proposal should be made part of the DOI proposal. This would not only serve to provide additional data on which to base future actions, but would also indicate to the people of the Pueblo the long-term assurance that the reclamation effort is a success.
- 26-5 | 5. Page 2-47. Preliminary results of the analysis of animals in the Church Rock, New Mexico, area indicated that high levels of radionuclides existed in certain animal tissue. Subsequent studies on additional animals from the same area are nearly complete. It is recommended that these studies be reviewed, as they may suggest that radiological analysis of meat from locally raised animals is warranted.

26-5(Cont.)

The information and data provided about the ingestion of radionuclides from the food route is very limited. Taken by itself, the uptake from food may be small. However, it is essential that these amounts be aggregated with amounts from other sources in order to determine a total exposure to individuals living in the area.

26-6

6. Page 2-50. The presence of a spring flowing at a rate of 100 gallons per minute into the pit is mentioned without any comment or attention to a consideration of sealing it. While this may not be a practical option from an engineering standpoint, it would contribute greatly to reducing the problems associated with ponding and should be examined.

26-7

7. Page 3-9. The monitoring of the highwall at Gavilan Mesa for potential areas of instability should be added to the DOI proposal.

26-8

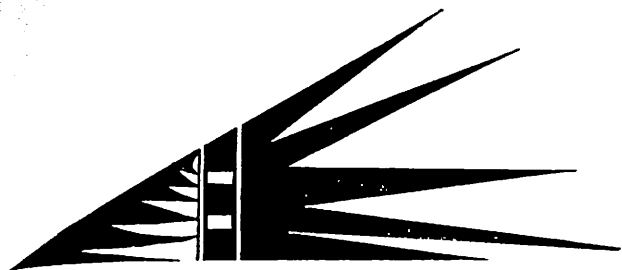
8. Worker safety, traffic, sanitation (water, sewage and solid waste), noise and other items related to the reclamation effort were not addressed in this EIS. It is assumed that the impact of these activities/items will be a part of the final EIS.

Once again we want to thank you for the opportunity to review this EIS.

Sincerely yours,



Gary J. Hartz, P.E.
Acting Director, Environmental Health
Branch, Indian Health Service



SOUTHWEST RESEARCH AND INFORMATION CENTER

October 4, 1985

Mr. Mike Pool, EIS Team Leader
U.S. Department of the Interior
Bureau of Land Management
Rio Puerco Resource Area
3550 Pan American Freeway, NE
P.O. Box 6770
Albuquerque, NM 87197-6770

Dear Mr. Pool:

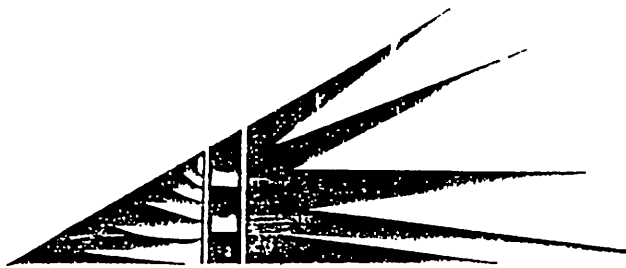
Please find enclosed a copy of Southwest Research and Information Center's comments on the Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project. We appreciate the opportunity to comment on this vital reclamation effort.

Please feel free to call myself, Paul Robinson, or Hollis Whitson if you have questions or needed additional background information.

Sincerely,

Chris Shuey, Coordinator
Ground Water Protection Project, SRIC

Enclosure.



SOUTHWEST RESEARCH AND INFORMATION CENTER

COMMENTS OF SOUTHWEST RESEARCH AND INFORMATION CENTER
ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR RECLAMATION OF THE JACKPILE-PAGUATE URANIUM MINE
LAGUNA RESERVATION, NEW MEXICO

prepared by

Wm. Paul Robinson
Chris Shuey
Hollis A. Whitson, Esq.

October 4, 1985

COMMENTS OF SOUTHWEST RESEARCH AND INFORMATION CENTER
ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR RECLAMATION OF THE JACKPILE-PAGUATE URANIUM MINE
LAGUNA RESERVATION, NEW MEXICO

prepared by Wm. Paul Robinson, Chris Shuey and Hollis A. Whitson, Esq.
October 4, 1985

I. Introduction.

The Department of the Interior ("DOI") released for public comment a Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project ("DEIS") on the Laguna Reservation in Cibola County, New Mexico, on March 5, 1985 (DEIS, title page). Southwest Research and Information Center ("SRIC") herein submits comments on the DEIS. Reclamation of the mine site and its surroundings is necessary to reduce or eliminate existing hazards to the public health, safety and the environment (DEIS, pp. 1-4 to 1-5).

The purposes of these comments are to (1) identify relevant data that are missing from, but integral to the DEIS, (2) recommend improvements in the Pueblo of Laguna's reclamation alternative, and (3) discuss the legal responsibilities of DOI in authorizing reclamation of the mine.

II. Summary of Comments and Recommendations.

A. Summary of Comments.

SRIC's comments address the following matters:

(1) The goal of reclamation must be restoration of the mine site and its surrounding environment to permit resumption of unrestricted use of the lands and waters of the area. 43 CFR 3575.1(b).

(2) The extent and severity of impacts to the surrounding environment from mining operations are greater than described in the DEIS.

(3) Restoration of the lands and waters can only be accomplished with significant modification of the alternatives presented.

(4) A "Modified Laguna" proposal consisting of backfilling of uncontaminated soils and rocks to a level 5 feet above the expected ground water recovery level will best achieve restoration of the mine site and its surroundings.

(5) The DEIS fails to describe in full and in detail the regional impacts of the various alternatives.

(6) DOI should adopt the most stringent reclamation alternative because the risk of exposure to emissions from the Jackpile mine is significant and greater than previously thought.

(7) DOI should not delay selecting a reclamation alternative because the Anaconda Company submitted a proposed reclamation plan after the publication of the DEIS.

B. Summary of Recommendations.

Among the recommendations SRIC makes in these comments are:

(1) DOI should adopt as a goal for reclamation the "restoration" of the mine site and its surroundings based on the unrestricted use of the lands and waters of the area for current and future generations.

(2) DOI should adopt a "Modified Laguna" alternative that achieves "restoration" of the mine site and its surroundings, including the restoration of surface and ground water quality for all use categories.

(3) DOI, in cooperation with the Pueblo of Laguna, should develop and install a long-term monitoring program for surface water (including that at Paguate Reservoir), ground water, vegetation recovery, and slope stability.

(4) DOI has the authority to and should increase Anaconda's performance

bond to cover the full costs of reclamation and restoration of the mine site and its surroundings.

III. The goal of "restoration" for reclamation is based on evidence in the record and the regulations of the Department of the Interior.

- A. The concept of "restoration" means returning the mine site and its surroundings to uses of the lands and waters of the area comparable to the uses that existed prior to mining.

The goal of reclamation is not stated in the DEIS. Based on the reasons given below, we recommend that DOI adopt as the reclamation goal the restoration of the site and its surroundings to permit resumption of the kinds of uses of the lands and waters of the area that occurred prior to mining. We define "restoration" by example: permitting development of ground water resources for human purposes, such as drinking water; allowing recovery of vegetation that supports livestock grazing; and resloping disturbed areas to contours comparable to those that existed before mining began, to the extent possible.

- B. The bases for "restoration" as the goal of reclamation are found in the hearing record and in the DOI mining regulations.

The concept of "restoration" as the goal of reclamation has several bases: the terms of the mining leases as described by testimony in the record, the statements of members and leaders of the Pueblo of Laguna, and DOI's own regulations for reclamation of mines on public and Indian lands.

Several members of the Pueblo testified at the public hearing held at the Laguna community center on the evening of September 11, 1985, that they viewed the mining leases with the Anaconda Company as requiring "restoration" of the mined area and its surroundings (Shuey 1985). They claimed that their "elders" who authorized the Bureau of Indian Affairs to enter into the leases with

Anaconda would not have done so if they thought the lands would not be returned to their original conditions and uses at the end of mining operations (Ibid.).

The members' sense of what constitutes "restoration" was described several times (Ibid.). Victor Sarracino spoke of "restoring" the Rio Paguete to a condition that supports irrigated agriculture and livestock watering (Ibid.). Calvin Pino testified that the water in Paguete Reservoir should be allowed to "recover" so that the residents of the Pueblo could use it again for downstream farming and so that wildlife would return to the area (Ibid.).

DOI's mining regulations require the agency "to promote operating practices which will avoid, minimize or correct damage to the environment -- land, water, and air -- and avoid, minimize, or correct hazards to public health and safety." 43 CFR 3570.0-1. The regulations define reclamation as:

"The measures undertaken to bring about the necessary reconditioning or restoration of land or water that has been affected by exploration, testing, mineral development, mining, onsite processing operations, or waste disposal, in ways which will prevent on control onsite and offsite damage to the environment." (emphases added)

43 CFR 3575.1(b). On Indian lands, DOI has a special responsibility to insure that "adequate measures be taken to avoid, minimize, or correct damage to the environment -- land, water, and air -- and to avoid, minimize, or correct hazards to the public health and safety." 25 CFR 216.1.

Members of the Pueblo desire the mined lands to be returned to a condition comparable with that prior to mining. The DOI regulations require reclamation measures that restore lands and waters in ways that will prevent damage to the environment. Reclamation, therefore, should proceed toward the goal of restoration of the mine site and its surroundings to permit unrestricted use of the lands and waters of the area.

IV. The extent and severity of impacts to the surrounding environment from mining operations at the Jackpile-Paguate mine are greater than described in the DEIS.

27-2 The National Environmental Policy Act (NEPA) requires that an EIS contain a full discussion of all direct and indirect environmental consequences which result from the alternative actions described. 40 CFR 1502.16. NEPA also requires a worst-case analysis where information is lacking or effects are uncertain. 40 CFR 1502.22. The DEIS fails to satisfy these NEPA requirements, for the reasons described below.

A. Radiological contamination in and around the Jackpile mine is greater than described in the DEIS.

27-3 The DEIS leads the reader to believe that the highest radium-226 concentration in surface water was 3.73 pCi/l at the Ford Crossing downstream from the mine (see Table 2-24, p. 2-46), based on Argonne National Laboratory sampling reported in 1983 (Momeni, et al., 1983). However, Eadie, et al. (1979) reported a radium-226 concentration of 4.7 pCi/l in surface water at Railroad Trestle No. 1. This datum was not included in the DEIS, despite the fact that the document which contains the information is referenced in the DEIS.

The DEIS omits data published in 1976 that showed radium-226 concentrations in ground water at the mine site 6 to 10 times higher than the radium-226 levels in ground water upgradient from the mine (Kaufmann et al., 1976). The Kaufmann study, which was sponsored by the U.S. Environmental Protection Agency ("EPA"), found a radium-226 concentration of 0.31 pCi/l in ground water from the Jackpile Sandstone (a local aquifer) upgradient from the mine, compared to radium-226 levels of 1.7 pCi/l and 3.7 pCi/l in ground water from the same aquifer inside the mine site (Ibid., figure 9). The latter

concentrations "are possibly related to mining operations which tend to increase levels of uranium and radium in ground water," the study said (Ibid., p. 306).

27-4 Neither does the DEIS include published data on the radionuclide content of sediments in Paguate Reservoir. This omission stems from DOI's decision that the possible effects of mining on Paguate Reservoir three miles downstream from the mine are outside the scope of the DEIS (DEIS, p. 1-7). We contend that impacts to Paguate Reservoir are very much within the scope of the DEIS because, as detailed below, the data omitted by DOI show direct downstream impacts on the lake from releases from the mine. Additionally, as noted in Part III above, DOI is required by its own regulations to consider methods of reclamation that take into account "offsite damage to the environment." 43 CFR 3570.0-5(i). And for purposes of Anaconda's reclamation bond, we recommend that the full cost of restoration of the mine site include costs associated with cleaning up Paguate Reservoir.

Popp et al. studied the possible effects of uranium mining and milling discharges on sediments in major tributaries of the Rio Grande and determined that the "highest radionuclide activities [in those tributaries] were found in the Paguate Reservoir sediments which are trapped immediately downstream from the Jackpile mine" (Popp et al, 1984; Exhibit 1). Table 1, which was derived from the data published by Popp et al., compares the average radionuclide content of Paguate bottom sediments to those in the Upper Rio Puerco (of the east). The Rio Puerco sediments were not affected by uranium mine and mill discharges, according to the authors.

In Table 1, the "Depth" column is indicated by S for surface sediments (from 0 to 1.5 meters), L for lower auger samples of sediments (1.5 meters to 5 meters), and V for valley fill sediments (greater than 5 meters). The

Table 1

AVERAGE RADIONUCLIDE CONCENTRATIONS IN SEDIMENTS FROM PAGUATE RESERVOIR
COMPARED TO SEDIMENTS FROM THE RIO PUERCO NOT AFFECTED BY URANIUM ACTIVITIES

<u>Radionuclide</u>	<u>Depth</u>	<u>Paguate Reservoir</u>	<u>Upper Rio Puerco</u>
Pb-210	S	5.39 (15.6)	1.26
	L	1.36	0.96
	V	1.44	0.88
Ra-226	S	11.5 (26.9)	1.19
	L	2.55	1.77
	V	2.74	1.63
Th-234	S	4.45 (9.35)	1.01
	L	1.30	0.85
	V	1.26	0.70
Pb-214	S	5.38 (13.6)	0.92
	L	1.29	0.89
	V	1.40	0.78

numbers in parentheses indicate the maximum levels found. The authors note that the surface sediments and lower auger sediments were deposited after mining operations began and the valley fill sediments in most cases pre-date mining activities.

Paguate Reservoir bottom sediments showed extensive radionuclide contamination in the upper 1.5 meters of sediments, compared to the Upper Rio Puerco surface sediments which were unaffected by mining discharges. The concentrations decreased rapidly with depth in the Paguate sediments, contrasting sharply with the more even distribution of radionuclides in soils from the Upper Rio Puerco.

The data led the authors to conclude that "recent sediments at Paguate Reservoir clearly show elevated levels of U-238 daughters in sediments dated after the mid-1950s. Sediments from the Jackpile uranium mine have been

trapped in the reservoir fill." That conclusion agrees closely with the observation of Mr. Pino, who stated in his testimony on September 11 (Shuey 1985) that he observed flashfloods carrying sediments from waste piles at the mine site downstream into Paguate Reservoir.

27-4(Cont.) The site-specific study by Popp et al. and the personal observations of Mr. Pino belie DOI's reasons for rejecting evaluation of the effects of mining on Paguate Reservoir (DEIS, p. 2-60). Those reasons were based on an Anaconda consultant's report that used indirect methods (precipitation analyses) to estimate sediment loading at the reservoir. Additionally, Popp's more recent data demonstrate measurable worsening of conditions downstream from the mine. The demonstrable impacts to the lake must be corrected in order to restore the reservoir to its original uses. DOI's failure to include the Popp data means that the DEIS fails to describe all direct and indirect consequences of the alternatives proposed. 40 CFR 1502.16.

B. Nonradiological contamination in and around the Jackpile mine is greater than described in the DEIS.

The DEIS's discussion of nonradiological hazards at the Jackpile mine is limited to the stability of slopes, highwalls, and waste dumps; subsidence; and underground mine openings (see, generally, pp 2-19 through 2-27).

27-5 Additional but limited data on nonradiological parameters in surface and ground water at the site also are presented (see Table 2-26 and Table 2-28). However, the DEIS neither discusses the severity of many of these hazards, nor includes published data on nonradiological parameters of wastes at the site. The DEIS also fails to describe the existence (or lack thereof) of "background" or baseline information that can be used to compare effects of mining to pre-mining conditions.

1. Reported uranium concentrations in surface water represent a hazard to livestock and humans.

Uranium concentrations in surface waters at the Ford Crossing and in Paguate Reservoir were reported as 0.239 mg/l and 0.236 mg/l, respectively (see Table 2-24). Studies by the National Academy of Sciences (NAS 1980) suggest that those concentrations may be harmful to livestock and humans who consume the water over a long period.

Based on animal studies and limited human data, the National Research Council's Safe Drinking Water Committee recommended a SNARL ("suggested no-adverse-response level") for uranium of 3.5 mg/l, based on a 24-hour exposure; 0.21 mg/l, based on a seven-day exposure; and no SNARL for chronic exposure because uranium was regarded as a carcinogen at that time (NAS 1980, pp. 177-178). The Committee noted that while no excess cancers were found in people who had consumed water containing 0.04 and 0.05 mg/l uranium, the element tended to accumulate in the largest amounts in kidneys and the bone (Ibid.). That finding led the agency to recommend that calculations of maximum permissible concentrations for uranium "should be based upon the chemical toxicity of the element and that the kidney should be regarded as the critical organ" (Ibid.).

27.6 Residents of Paguate and Laguna have historically used the Rio Paguate, a perennial stream, for livestock watering and irrigation. Additionally, the river water flows into Paguate Reservoir, which also is used for the same purposes. The high uranium concentrations in the stream water constitute a hazard to the residents and their livestock. The DEIS must assess the effects of that hazard on the residents and their livestock.

2. A state agency is considering establishing a surface water standard for uranium that is about 7 times lower than the reported uranium concentrations in the Rio Pagate.

Based on the NAS recommendations, the Arizona Department of Health Services (ADHS) is considering adoption of a surface water standard for uranium that is about 7 times lower than the uranium concentrations reported in the Rio Pagate and Pagate Reservoir downstream from the Jackpile mine (ADHS 1985b; Exhibit 2).

ADHS recommended a uranium SNARL of 0.035 mg/l for the Puerco River of the West after taking into account uncertainties in the chemical toxicity of uranium and recognizing the extensive livestock use of the stream in western New Mexico and eastern Arizona. The agency's recommendation came in the wake of chemical analyses showing 0.29 mg/l uranium in surface water in February and 0.64 mg/l to 0.86 mg/l uranium in surface water in June at two different locations in the Puerco River (sample reports attached as Exhibit 3 [ADHS 1985a] and Exhibit 4 [Accu-Labs 1985]).

3. Waste piles in the Jackpile mine contain elevated concentrations of trace metals that could adversely affect ground and surface water quality after reclamation.

27-7 Ground and surface water quality, based on sampling of a limited set of nonradiological parameters, was reported in Tables 2-28 and 2-26, respectively. The DEIS did not assess the possible causes of the elevated concentrations reported in the tables or include data on trace-metal content of the Jackpile Sandstone. Those data are needed to determine what levels constitute restoration of quality to permit unrestricted use of the surface and ground waters at the site.

Published data (Moench and Schlee, 1967) suggest that the metals are derived from the ore-bearing rocks and that oxidation of the ores and waste

materials contribute to the elevated concentrations reported in Tables 2-26 and 2-28. If not adequately isolated from the environment so that oxidation potential is greatly reduced, the waste materials may continue to leach toxic metals to the ground and surface water systems following reclamation. As a result, restoration of the lands for unrestricted use could be jeopardized.

Metals in concentrations in the parts-per-thousand range (fractions of 1 percent) in the Jackpile Sandstone include aluminum, iron, manganese, barium, copper, molybdenum, nickel, lead, strontium, and vanadium, among many (Moench and Schlee, 1967; Table 9). Those parameters reported in the DEIS as elevated in ground and surface waters match closely with the metals reported by Moench and Schlee to be elevated in the ore-bearing sandstones.

Additionally, many of the trace metals were shown to occur adjacent to the uranium deposits in the Jackpile Sandstone (Moench and Schlee, 1967; pp. 61-63). This phenomenon, which also has been reported to occur adjacent to sandstone uranium deposits in Wyoming (Deutsch et al., 1983; Figures 16 and 17), suggests that trace metal concentrations would be significantly elevated in the protore piles and ore-associated wastes in the mine.

- C. The DEIS fails to note that protore piles and ore-associated wastes at the Jackpile mine contain levels of radioactive materials concomitant with those in uranium mill tailings.

An analysis of the DEIS shows that protore piles and ore-associated wastes at the Jackpile-Paguate mine contain levels and volumes of radioactive materials similar to those found in uranium mill tailings. Using data obtained from the DEIS (see, e.g., Table 2-13, Table 2-4) and from the U.S. Environmental Protection Agency's Final Environmental Impact Statement for Uranium Milling (USEPA 1983), Table 2 below compares radioactive materials at the minesite to those of the "model" (or average) mill tailings pile.

Table 2

COMPARISON OF RADIOACTIVE MATERIALS IN JACKPILE MINE WASTES
TO THOSE IN AVERAGE URANIUM MILL TAILINGS PILES.

	Barren Waste	Ore-Associated waste	Protore	Model Uranium Tailings Pile
U308 (percent)			0.02-0.059	0.007
U-238 (pCi/g)	<5.	5-55	>55	39
Ra-226* (pCi/g)	<5.	5-55	>55	280
Volume (millions of tons)			appx. 20	appx. 9.9

* Estimated values based on the assumption that Ra-226 and U-238 are in secular equilibrium in the Jackpile Sandstone.

The limited data shown demonstrate the similarities between radioactive wastes at the Jackpile mine and those at the model uranium mill. The Jackpile ore-associated wastes and protore contain as much or more uranium than the model tailings pile, and about a fifth as much radium. More importantly, the Jackpile protore, which has a higher uranium concentration than mill tailings and analogous levels of trace metals, has more than twice the volume of the model tailings pile.

27-8 The data are limited for a number of reasons. First, the DEIS assumed, without the benefit of actual measurements, that radium-226 is in secular equilibrium with uranium-238. The EPA data show that radium is not always in equilibrium with uranium in uranium mine and mill wastes. Second, the DEIS does not contain any other data on the chemical characteristics of the Jackpile wastes. This omission is inexcusable, given the volume and toxic nature of the wastes.

Third, the DEIS contains no information on the volume of ore-associate waste piles at the mine. Table 1-2 of the DEIS states that waste dumps cover

1,266 acres. Assuming conservatively that the volume of material covering that area is roughly one-half of the volume of protore, the Jackpile mine would contain approximately 30 million tons of contaminated material (protore plus ore-associated wastes). That volume would rank the Jackpile mine second behind the largest uranium mill tailings pile in the country, in terms of volume.

- D. The level of the hazards in Jackpile waste materials requires isolation and containment equal to that for uranium mill tailings.

27-9 Given the stark similarities between the Jackpile wastes and uranium mill tailings, the mine wastes should be controlled as uranium mill tailings are controlled by the requirements of EPA's 40 CFR 192, Subpart D, standards for tailings at active mills. (See Table 2-12 of the DEIS for a listing of federal radiation standards.) While we do not intend that the Department of the Interior prescribe the tailings standards for the Jackpile wastes, we believe the mill tailings standards are appropriate for guidance in reclamation of the mine. For instance, in choosing a reclamation alternative, DOI can be guided by the EPA's longevity requirement for tailings control. The Laguna alternative, with the modifications listed in Part V below, would come the closest of any of the alternatives to guaranteeing stabilization for up to 1,000 years.

- E. The DEIS fails to disclose relevant background, or "baseline," data which are needed to determine existing impacts from the mine.

27-10 Limited data on baseline ground and surface water quality are contained in Tables 2-23, 2-24, 2-26, and 2-28 of the DEIS. The tables do not contain relevant information on surface and ground water quality upgradient from the mine. (See discussion in Part IV.A. above.) Neither are they extensive, considering the 30 years of mining at the site and the thousands of pages of

27-10(Cont.)

mining plans and monitoring reports submitted by Anaconda to DOI. DOI must summarize what baseline information it has in its files and publish that data in the Final EIS, or state clearly that such data do not exist.

Various studies have demonstrated the importance of collecting adequate baseline environmental information (see, e.g., Gallaher and Cary 1985; Millard et al., 1983; and Shuey and Robinson, 1984). Background data are essential for comparing the pre-mining environment to the post-mining environment (to the extent such comparisons can be made) and are absolutely necessary to determine what levels of reclamation are appropriate for restoration of the lands and waters of the area.

27-11

In summary, the DEIS fails to sufficiently describe the radiological and nonradiological contamination at the mine site and its surroundings. There are significant gaps in relevant and timely information, uncertainty in the available data, incomplete analysis, and lack of baseline parameters. The data and analysis are needed to determine what levels of reclamation are needed to restore the land and its waters to uses comparable with those that existed prior to mining. Since the data are incomplete and uncertain, and lack comparative value due to the lack of baseline information, DOI must include a worst-case analysis in the Final EIS. 40 CFR 1502.22. Finally, the FEIS should recognize the similarities between uranium mill tailings and wastes in the mine and use EPA's mill tailings standards for guidance in making reclamation decisions.

V. Restoration of mined lands and affected areas can only be accomplished with significant modification of the alternatives.

A. The DEIS fails to disclose the fact that no alternative permits the future use of ground water at the reclaimed mine site.

The DEIS states that ground water quality (as measured by salt content and conductivity) will worsen considerably as ground water levels recover over time with the implementation of any of the alternatives (p. 3-31). The DEIS also acknowledges that water in intermittent ponds formed as a result of reclamation will be "saline and unfit for use," at least in the case of the Anaconda alternative. Under Anaconda's latest proposal (Anaconda 1985), natural meandering of the Rio Moquino, which is reported to have moved laterally up to 250 feet (DEIS, p. 2-61), could cause stream water quality degradation after reclamation. Such degradation may result from stream cutting of waste piles and protore piles because those wastes are to be moved away from the centerline of the stream by only 50 feet under the new proposal (Anaconda 1985; Table 1).

27-12 | Despite this picture of continued water quality degradation following reclamation, the DEIS does not describe in detail the potential effects on water quality of the leaching of trace metals into ground water and surface water as a result of continued oxidation of the waste materials. As noted above in Part IV, neither does the DEIS contain data on the trace-metal content of those wastes. The DEIS states only that the "increased contact with oxidized and broken waste would initially increase TDS and heavy metal concentrations" (p. 3-31).

27-13 | None of the alternatives will permit unrestricted use of ground water resources at the site following reclamation, apparently because of the continued buildup of salts in the ground water recovery zones (DEIS, p. 3-31). In fact, the DEIS acknowledges that even after oxidation ceases and reducing

conditions prevail, "leachate in the ground water would approximately double the background conductivity values" (Ibid.). Neither do the alternatives consider long-term monitoring of surface and ground water to detect trends in improvement or degradation of water quality over time. Since one of the goals of restoration is the use of ground water at the site for human consumption, a doubling of salt content over background would make the water unfit for drinking purposes.

27-13(Cont.)

The potential for continued water quality impairment after reclamation, while recognized in the DEIS, was not thoroughly described because of the lack of information on trace-metal content of the waste piles and protore piles in the mine pits. Inasmuch as the metals persist forever, use of the recovered ground water for human consumption -- the highest use of any water -- appears to be jeopardized, if not precluded, under any of the alternatives. Without protection of the ground water resource from hazardous substances in the wastes, additional health and environmental risk will be built into implementation of any of the alternatives. DOI is not free to implement an alternative that does not "minimize, or correct, hazards to public health and safety." 43 CFR 3570.0-1.

27-14

- B. A "Modified Laguna" alternative will allow restoration of ground water for drinking water purposes.

The Laguna alternative, which has the highest probability of satisfying the goal of unrestricted use, especially for establishment of grazing areas in the reclaimed mine site, can be modified to permit the use of ground water for human consumption following reclamation. Therefore, SRIC recommends a "Modified Laguna" alternative that consists of the following stages:

- (1) Backfilling of uncontaminated borrow material up to 5 feet above the

expected ground water recovery level.

(2) Compaction of a layer of shales (1 to 2 feet thick) on top of the initial backfill materials.

(3) Backfilling of protore and ore-associated wastes on top of the compacted shales.

(4) Emplacement of at least 5 feet of stabilization covers consisting of the same uncontaminated borrow material used for initial backfilling, followed by revegetation. Final slopes would be at least 3:1; those slopes that cannot be regraded to 3:1 would be further stabilized with 1 foot of riprap (large rocks and boulders) to provide armoring and slope stability.

27-14(Cont.) In the "Modified Laguna" alternative just described, "uncontaminated borrow material" means topsoil, crushed Tres Hermanos Sandstone, and shales derived from the Mancos Shale. We believe those materials are "uncontaminated" (relative to the protore piles and ore-associated wastes) based on their chemical and physical properties presented in Tables 2-32 and 2-33 of the DEIS. We also believe there are sufficient volumes of such materials to permit initial backfilling and final covering. According to the DEIS (Table 1-4), there are 487 acres of waste dumps containing topsoils, Tres Hermanos Sandstone and shales exclusively, and another 347 acres of waste dumps containing from 18 inches to 24 inches of identical materials.

Following backfilling of uncontaminated materials, shales segregated from the waste piles and derived from the Mancos Shale would be used to create layers of low-permeability strata on top of the initial backfill materials. Protore piles and ore-associated wastes (both of which contain elevated concentrations of radionuclides and metals), in that order, would be placed on top of the shales. The remaining uncontaminated borrow materials would be used for final covers at least 5 feet thick. Resloping, furrowing of slopes, and

revegetation as described in the Laguna alternative discussed in the DEIS would complete reclamation. (See discussion at pp. 3-40 to 3-42 of the DEIS.)

The "Modified Laguna" alternative recommended herein has several advantages over any of the alternatives evaluated in the DEIS. The most significant benefit would be the restoration of ground water for drinking water uses. There are several reasons why we believe that under a "Modified Laguna" alternative ground water will not be contaminated beyond the need for minimal bacterial treatment.

27-14(Cont.) First, fewer contaminants would be leached to the ground water system as it recovers through the backfilled uncontaminated materials, even as oxidation continues for several years following reclamation. Extensive ground water monitoring would be needed before the water is released for human consumption as a prevention measure. Such monitoring is not a disadvantage of the "Modified Laguna" plan; rather, it is essential, as monitoring is essential for any of the alternatives. The fact that none of the alternatives include extensive water quality surveillance following reclamation is one of the reasons why they are not adequate to insure restoration of the mine site to conditions comparable to those that existed prior to mining.

Second, the emplacement and compaction of low-permeability shales on top of the initial backfill materials would provide a hydrologic barrier between the ground water and the more contaminated wastes above it.

Third, placing the protore piles and ore-associated wastes -- the most contaminated wastes at the site -- on top of the shales and covering those wastes with uncontaminated borrow materials to a depth of at least 5 feet will inhibit downward percolation of runoff into the ground water recovery zone. This multi-layer ground water protection system is precisely the kind of isolation of wastes that is considered in the EPA uranium mill tailings

standards, in EPA's FEIS on those standards (EPA 1983) and in NRC's GEIS on uranium milling (NRC 1980). Our recommended plan is a less stringent variant of those standards because we recognize that the volume of wastes at the Jackpile mine is large and rather burdensome to move great distance. We feel strongly, however, that mill tailings containment techniques be used to control wastes at the Jackpile mine because of the similar types and levels of hazards in the mine wastes.

27-14(Cont.) The fourth advantage of a "Modified Laguna" alternative is that it reduces the volume of wastes that must be resloped and regraded. More material would be deposited back in the pits than in any of the alternatives described in the DEIS. Mass wasting of reclaimed waste piles, and resulting blockage of drainage channels, would be reduced or even eliminated. The reduced volume of wastes left outside of the pits would reduce the potential for arroyo headcutting and increase the area in which the streams could naturally meander. All high-hazard wastes (protore piles and ore-associated wastes) would be placed under 5 feet of cover and on top of relatively impervious shales. This is a decided advantage over Anaconda's August 1985 proposal which envisions leaving protore piles in their present locations.

Potential disadvantages of a "Modified Laguna" alternative include formation of perched water in the protore and ore-associated waste zones (such perched ground water would not be fit for human or livestock consumption) and reduction of the potential for use of alternative mining methods (such as in-situ leaching) for recovery of residual uranium minerals from the protore zone. Additionally, we have not performed detailed calculations of the volumes of wastes that would be needed to backfill to above the expected ground water recovery level, nor have we estimated the additional cost of such a plan.

The advantages of a "Modified Laguna" alternative far outweigh the

potential disadvantages, however. Our recommended alternative would have the greatest chance of restoring the site to its highest uses and to conditions comparable to those that existed prior to mining. We request, therefore, that DOI consider a "Modified Laguna" alternative in the Final EIS.

- C. The Final EIS should describe all data gaps and circumstances which may preclude restoring the mine site and its surroundings to conditions comparable with those that existed prior to mining.

In the Final EIS, DOI should make clear that certain information is lacking and that uncertainty exists with regard to the potential for future uses of the reclaimed mine site. 40 CFR 1502.22. The data gaps discussed in these comments should be noted. The FEIS should also describe the "Modified Laguna" alternative as presented in the subsection above, analyze whether it is technically and financially feasible, and state the reasons for accepting or rejecting it. Where there remains uncertainty due to a paucity of data, DOI must perform a worst-case analysis that reveals the range of possible risks. 40 CFR 1502.22.

- VI. The DEIS fails to describe in full and in detail the regional impacts of the various alternatives.

- A. Downstream water quality impacts result from mining at Laguna.

As noted in Part IV above, Popp et al. (1984) showed that uranium mining and milling discharges in the Grants Mineral Belt have had quantifiable, long-term effects on radionuclide and heavy metal content of sediments in tributaries to the Rio Grande. Pagate Reservoir sediments showed particularly extensive loading of radionuclides which the authors traced to discharges from the upstream Jackpile mine (Ibid.).

Another published study, which was omitted from consideration by the

DEIS, sheds further light on the regional water quality impacts from uranium mining activities in the Mineral Belt. Brandvold et al. (1984; Exhibit 5) showed that the transport of large volumes of sediments to the Rio Grande from its major tributaries was delivering excessive amounts of radionuclides, heavy metals and pesticides to the bottom sediments of Elephant Butte Reservoir.

In the course of their investigation, the authors found that much of the radionuclide and heavy metal loading was a result of upstream uranium mine discharges. The radionuclide loading correlates well "with stream sediments from the Grants Mineral Belt," the study said (Brandvold et al, 1984; p. 20). Uranium concentrations in the bottom sediments of Elephant Butte ranged from 180 parts per million to 280 ppm (Ibid.; Table 2). By comparison, the 280 ppm is only less than one-tenth of the minimum uranium content (0.02 percent) of the protore piles at the Laguna mine.

27-15 | It is reasonable to believe that discharges from the Jackpile mine into the Rio Paguete and, in turn, into the Rio San Jose and Rio Puerco, contributed to the build up of excessive uranium concentrations in sediments in the Rio Grande and Elephant Butte Lake. The indirect effect on a waterbody 200 miles downstream demonstrates part of the regional impact traceable to the Jackpile mine. Those same regional effects are another reason why the DEIS should have considered impacts of mining on Paguete Reservoir and why the DOI is violating its own regulatory requirements by not considering offsite damage to the environment.

27-16 | B. Radon gas and radioactive particulates from the Jackpile mine travel many miles downwind, thereby exposing hundreds of thousands of New Mexico residents.

The penchant for radon gas and its decay products to travel scores of miles from their sources is well documented (EPA 1983, pp. 5-8 to 5-11; USNRC

1980, generally, Vol. I, chapter 9). Concentrations of ambient radon greater than background and current regulatory levels (see, e.g., 10 CFR 20, Appendix B, population exposure criteria) were detected in the Grants uranium mining and milling district as a result of a two-year continuous air sampling program conducted by the New Mexico Environmental Improvement Division (Buhl, et al., 1985; Executive Summary attached as Exhibit 6).

The DEIS shows the potential for regional radiological impacts from all the alternatives (see, e.g., pp. 3-17 to 3-25). It estimates that between 95 and 243 radiation-induced cancer deaths would result from the "No Action" alternative at the Jackpile mine. The number of cancer deaths attributable to the Jackpile mine is small compared to the expected number of cancer deaths in a large population, but such a comparison inappropriately minimizes the absolute impact of leaving the minesite unreclaimed.

The expected regional radiological impact from the "No Action" alternative appears to be even greater than that predicted for the Grants-area population from radon and radon progeny releases from mining and milling activities northwest of Grants. Buhl et al (1985) predicted a lifetime cancer risk of one chance in 5,500 from an average ambient radon concentration of 4.0 pCi/l. For a population the size of Grants's (roughly 11,000), such exposure would result in two deaths.

By comparison, the risk to the regional population within 50 miles of the Jackpile mine ranges from about one death in 5,000 to one death in 2,000, assuming a population of 500,000 and a range of cancer deaths attributable to the Jackpile mine of 100 to 250 (rounding 95 and 243). These health risks demonstrate clearly why the "No Action" alternative, and any other reclamation option which does not consider long-term containment of the high-hazard wastes at the site, is totally inadequate to protect the health and safety of the

residents of the regional population.

VII. The DEIS must adopt the most stringent reclamation alternative because the risk of exposure to emissions from the Jackpile mine is significant and greater than previously thought.

27-16(Cont.) The health risks of radon gas, its progeny, and other radioactive materials associated with the uranium decay chain are well known and well documented. We now know, based on several new studies, that the health effects of radon and its decay products are potentially more significant than previously estimated. Additionally, a federal appeals court has upheld EPA's standards for uranium mill tailings, and implicitly, the health assessment upon which those standards were based. These recent developments demonstrate that the most stringent reclamation alternative must be adopted to ensure protection of public health and the environment. The Final EIS must consider these new studies and the recent court decision in its evaluation of the risks posed by each alternative reclamation option.

A. Recent scientific studies further demonstrate the health risks of radioactive emissions from uranium facilities.

Three recent studies of the effects of radioactive emissions from uranium facilities, studies which were not included in the DEIS, give additional support to the view that the health risks associated with exposure to those emissions are significant and greater than previously thought. The studies give further credence to calls for reclamation that employ stringent levels of control of the hazards present. The Final EIS for reclamation of the Jackpile mine should use this latest research to determine if the health effects described in the DEIS are accurate.

The first study (Radford and Renard, 1984; Exhibit 7) showed that

exposure to radon gas for many years at levels equal to the current in-mine regulatory limit "is associated with high lung-cancer risks" and that "even short exposures can give rise to significant excess lung cancer" (Ibid., p. 1493). The study showed that the effects of cigarette smoking and exposure to other hazardous substances could be separated from the effects of exposure to radon and its decay products (Ibid.). According to the study, the average latency period for development of health effects in miners is now 40 years (Ibid.). The lengthy period between initial exposure and development of a health effect is especially important for consideration in the Jackpile DEIS because of the 30 years of mining history at the site.

The second study (NIOSH, 1984; Exhibit 8), a draft report by the National Institute for Occupational Safety and Health, recommended that the current radon exposure limit for uranium miners be reduced from 4 Working Level Months to 1 WLM. The recommendation was based on an evaluation of recent studies of the health effects associated with exposure to radon and its decay products.

The third study (USEPA 1985; Exhibit 9), which EPA used as a basis for setting a radon emission limit for underground uranium mines, described the agency's methodology for predicting local and regional health effects from radon emissions from uranium mines. The study used much of the same data base that EPA used to adopt its mill tailings standards.

- B. Recent 10th Circuit Court of Appeals decisions on uranium mill tailings standards substantiate the view that radon and other hazardous substances at uranium facilities pose high levels of risk.

In an early September decision, the 10th Circuit Court of Appeals upheld EPA's standards for uranium mill tailings at both inactive processing sites and active mills. (See, e.g., American Mining Congress v. EPA, No. 83-1014; Sierra Club, et al. v. EPA, No. 83-1206; American Mining Congress, et al. v.

Thomas, 83-2226; and Environmental Defense Fund, et al. v. Thomas, 83-2504.) The Court rejected arguments by the uranium industry that the standards were overly stringent because EPA had overestimated the health effects of radon gas and other radioactive emissions from mill tailings in adopting the standards. The Court also rejected the arguments of environmental groups who said the standards allowed too much excess risk of cancer following reclamation of tailings piles. (Slip Opinions on both cases are available from SRIC.)

In regard to EPA's analyses of risks from radon emissions from tailings piles, the court said, "We think there is reasonable authority to support the EPA's method of risk calculation in regard to its potential lung cancer deaths estimate" (Slip Opinion, p. 31; consolidated cases Nos. 83-1014, 83-1041, 83-1206, 83-1300). And in regard to a complaint raised by the uranium industry that few people live near tailings piles, the Court said, "Radon emissions from these piles will occur for thousands of years unless prevented. Public awareness of the dangers may wane. The industry petitioners' criticism does not undermine the validity of the risk assessment; it only points to the limited number of persons who currently may be subject to the risk" (Ibid., p. 33).

While the Court addressed many different issues raised by both sides, its statements on the matters of risk are instructive for DOI in its implementation of reclamation at the Jackpile mine. First, the bases for EPA's standards — its studies of radon risks — are fully supported by facts and reasonable policy decisions. Second, the risks from tailings are essentially the same risks DOI must address in reclaiming the Jackpile mine. And third, the fact that few people live within a short distance of the source of the risk makes little difference. As discussed above, the DEIS recognizes the large number of people potentially at risk within a 50-mile radius of the

Jackpile mine.

The Court of Appeals decisions on mill tailings give DOI ample legal justification to select the most stringent alternative for reclamation of the Jackpile mine and to reject any alternative, including Anaconda's August 1985 proposal, that seeks to reduce the level of control of the hazards present at the mine.

VIII. DOI should not delay selecting a reclamation alternative because Anaconda has submitted another proposed reclamation plan.

A. There is no compelling legal reason to delay a decision on the preferred reclamation alternative.

The Department of the Interior need not revise the DEIS because of Anaconda's August 1985 proposal (Anaconda 1985). The Department needs only ensure that the DEIS and Final EIS both contain a reasoned discussion of the alternatives. 40 CFR 1502.14. The DEIS already includes a wide range of alternatives, including a "No Action" alternative which is virtually no different in practice than Anaconda's latest proposal. (See Part VIII.B. below for further details.)

While SRIC contests the sufficiency of the discussion of those alternatives, we do not believe that the insufficiencies we describe herein are caused by the Department's omission of the latest Anaconda proposal. Indeed, the environmental effects of the latest proposal are covered by the discussion of the environmental consequences of the "No Action" alternative. The fact that Anaconda has created a variant of the "No Action" alternative should not preclude swift Department action to protect those affected by the Jackpile mine. Additionally, DOI could not have known that Anaconda would submit a last-minute proposal in August 1985, more than eight months after the DEIS was published. Laguna Governor Chester Fernando recognized this last-minute plan

for what it is — "an attempt to delay [Anaconda's] obligation to reclaim" (Shuey 1985).

For the sake of argument, suppose that DOI drafts a revised DEIS containing the latest Anaconda proposal. Suppose further that Anaconda drafts another proposal after release of the revised DEIS. Certainly DOI would not feel compelled to once again revise the DEIS. The Department should carefully analyze any suggestions for a revised or supplemental DEIS. Where demands for a revised DEIS are based upon alleged inadequate consideration of alternatives, it is appropriate for the Department to analyze the dynamics involved in the emergence of the unconsidered, new alternative.

The latest Anaconda proposal is the company's sixth since the reclamation decision-making process began several years ago. The company has had ample time to make proposals and provide input into the development of the alternatives in the DEIS. Indeed, both the Department and Anaconda have been actively involved in the process leading up to the current DEIS since 1977. A formal scoping process was begun in 1980, and two public hearings were held in 1981. Anaconda representatives participated fully throughout the scoping process and other preliminary phases. In 1982, Anaconda offered the revised proposal that is the subject of the DEIS. Since 1982, Anaconda has participated in numerous meetings with DOI staff, the Pueblo of Laguna, and others to work out the proposed action and other matters relating to the reclamation component of the mine plan. Not until eight months after the release of the DEIS in February 1985 did Anaconda release its latest reclamation "plan." The Department cannot be faulted for Anaconda's negligent or intentional delay in presenting the latest proposal.

Should DOI further delay the EIS process by rewriting the DEIS to include Anaconda's August 1985 plan, the Department would be exposing itself to

challenge for failing to enforce the terms of Anaconda's mining lease and applicable DOI regulations pertaining to mining leases. The Department — not Anaconda directly — is responsible for enforcing the laws and regulations of the United States and insuring that the federal trust responsibility to the Pueblo is fulfilled.

The Department has an obligation to follow its own regulations and enforce the law. This is especially true where, as here, Anaconda has consented to alter its original mining and reclamation plan. (See 43 CFR 3572.2(e), (f).) Moreover, Anaconda has posted a performance bond and thus has a forfeitable investment in "the faithful compliance with applicable regulations, the terms and conditions of the permit, lease, or contract, and the exploration or mining plan as approved, amended or supplemented." 25 CFR 216.8(a).

Given Anaconda's reluctance to perform reclamation as required by the DOI regulations, SRIC recommends that the Department increase the amount of Anaconda's bond. 25 CFR 216.8(c). Performance bonds are conditioned upon the "faithful compliance" with the regulations, lease terms, mine plan, and DOI orders. 25 CFR 216.8(a). The bond must be sufficient to satisfy the reclamation requirements. In determining the amount of the bond, the Department should consider the "character and nature of the reclamation requirements and the estimated costs of reclamation in the event that the operator forfeits his performance bond." 25 CFR 216.8(a).

The reclamation alternatives considered in the DEIS range in cost from \$52 million to \$57 million. A "Modified Laguna" alternative, as described in Part V above, may cost even more. Moreover, the DEIS shows that the 1982 Anaconda alternative may not be adequate to protect water quality (p. 3-30) or to allow vegetation to recover to pre-mining conditions (p. 3-42). Thus, under

any of the alternatives, Anaconda's current bond amount is at least \$11 million to \$16 million less than needed to cover the full cost of reclamation, a criterium mandated by regulation. DOI should immediately increase Anaconda's bond to cover the full cost of reclamation and to fulfill the letter and spirit of the Department's own bonding requirement.

The Department has the legal responsibility to either enforce laws and regulations requiring reclamation or to perform reclamation despite a company's recalcitrance. We trust that DOI will exercise that responsibility in this case and not succumb to delaying tactics such as those represented by Anaconda's August 1985 proposal.

- B. Anaconda's August 1985 reclamation proposal is not adequate to protect the public health and safety, and in practice provides no more protection of the public health and safety than the "No Action" alternative.

27-17 In addition to the absence of a legal or regulatory justification for delay, neither must DOI supplement the DEIS because Anaconda submitted a new reclamation plan in August 1985. This last-minute proposal provides no more protection of the public health and safety than the "No Action" alternative. The DEIS already describes the consequences of a "No Action" alternative as being unacceptable for protecting the public health and safety (pp. viii-ix). A comparison of Anaconda's latest plan to the three alternatives evaluated in the DEIS demonstrates that the August 1985 proposal varies little from the "No Action" alternative and is substantially less adequate than any of the other reclamation options.

A major retreat of the new plan from the alternatives discussed in the DEIS is in the handling of protore piles in the mine site. Whereas Anaconda's 1982 plan envisioned backfilling the protore into the excavated pits, Anaconda

now seeks to leave those piles in their present locations and "stabilize" them with only 1 foot of cover (Anaconda 1985; pp. 1-2). Anaconda offers no justification or analysis for why such a proposal will be adequate to prevent releases of radioactive materials or allow reestablishment of a vegetative cover.

27-17(Cont.) The DEIS's analysis of health effects resulting from implementation of the various options assumes that the protore piles -- the wastes with the highest concentrations of hazardous substances -- will be backfilled and covered with tons of rock and topsoil; that is, isolated from the surrounding environment. If the mine site is not reclaimed, emissions from the site will cause 95 to 243 excess cancer deaths (DEIS, p. 3-31). Implementation of any of the three action alternatives would reduce risks to 0.1 percent of those attributable to the "No Action" alternative. Stated in another way, each of the action alternatives would reduce the number of cancer deaths to well below 1.

It is reasonable to conclude, therefore, that Anaconda's latest proposal will not reduce to less than 1 the number of cancer cases attributable to emissions from the mine. Some of those 95 to 243 cancer cases will remain if this latest plan is implemented because the most hazardous wastes at the site will not be contained beneath several feet of topsoil and rocks. Any plan which sentences people within 50 miles of the mine to death by cancer after reclamation must be rejected.

Another significant difference between Anaconda's August 1985 plan and its 1982 proposal is in the handling of waste dumps at the mine site. Our analysis shows that seven dumps covering 405 acres would be moved only 50 feet back from the centerline of an adjacent stream, not the 200 feet proposed under the 1982 plan. The 1982 plan itself was inadequate because the pre-mining meander

belt of the Rio Moquino was determined to be 400 feet with lateral movements of up to 250 feet (DEIS, p. 2-61). By moving waste piles back only 50 feet, the 1985 plan would contribute to continued surface water quality degradation and eventual erosion of the waste dumps -- impacts not much different than those attributable to the "No Action" alternative (DEIS, Table 1-5, p. 1-28).

And finally, there is no reason to believe that vegetation will recover under Anaconda's latest plan because there is doubt it will recover under Anaconda's more extensive 1982 proposal. According to the DEIS, revegetation experiments at the mine site are only partially successful and depend greatly on "erratic" rainfall (p. 3-40). Reseeding of some areas already is necessary (Ibid.). The DEIS further states that under the 1982 Anaconda option, "revegetation that approximates the density and diversity of natural terrain is unlikely because of soil surface instability and recurrent erosion" (p. 3-42).

Such erosion and instability are likely to persist if Anaconda's latest plan is implemented. Under the plan, many of the existing steep slopes on waste piles will remain. And 1 foot of cover on protore piles will not be sufficient to prevent erosion, even on slopes of 3:1.

In sum, Anaconda's August 1985 reclamation proposal represents a substantial retreat from its 1982 plan and is only marginally more effective than the "No Action" alternative described in the DEIS. The latest plan will not "avoid, minimize, or correct hazards to the public health and safety" as required by the DOI regulations, nor restore the mined lands to permit uses comparable with those that existed prior to mining. For those reasons, we urge DOI to reject the 1985 Anaconda plan as a viable reclamation alternative and to proceed without delay to the publication of a Final Environmental Impact Statement for reclamation of the Jackpile-Paguete mine.

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STATE OF NEW MEXICO

OFFICE OF THE GOVERNOR

SANTA FE

87503

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GOVERNOR

October 4, 1985

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U. S. Bureau of Land Management
Albuquerque District Office
Rio Puerco Resource Area
P.O. Box 6770
Albuquerque, New Mexico 87197-6770

Re: Jackpile-Paguate Uranium Mine Reclamation DEIS

Dear Mr. Luscher:

The State Clearinghouse for Environmental Review has examined the above-mentioned document for consistency with state policy and the individual laws and regulations of each agency and submits the following comments. Agencies consulted in the review process include the Environmental Improvement Division, Energy and Minerals Department, Office of the Attorney General, State Historic Preservation Office, Natural Resources Department, Department of Game and Fish, and Department of Finance and Administration.

General Comments

Environmental Impact Statement (EIS) Process: The State of New Mexico has as its primary concern the prompt and effective cleanup and reclamation of the Jackpile-Paguate uranium mine site for the protection of environmental quality and public health. To this end, we support the timely completion of the EIS process and a final approval of an acceptable reclamation plan by the Secretary of the Interior. We believe that all of the State's concerns regarding the DEIS itself can be addressed adequately in a Final EIS and urge the BLM to respond to these concerns within the context of the existing EIS process.

28-1 We further recommend that the recently introduced Anaconda Company 1985 Multiple Use Reclamation Plan for the Jackpile-Paguate Uranium Mine not be formally considered as a reclamation alternative, nor that preparation of a new EIS be conducted to accommodate consideration of this plan. The new Anaconda plan was submitted far too late in the process to receive equal treatment as other alternatives. Anaconda Company has had a complete opportunity during the scoping process to participate in the development of alternatives and to identify issues to be addressed in the DEIS. We believe that BLM ought to respond to the new Anaconda Company plan in the same manner as it addresses other public comments, and that starting a new EIS process (as suggested by the Company) would only contribute to delays in the actual clean up of the minesite, and in the mitigation of conditions which presently pose significant health and safety hazards.

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9 We believe the range of alternatives currently assessed in this document is reasonable and sufficient to meet the requirements of the National Environmental Policy Act. By requiring analysis of alternatives, the Act does not imply that an infinite range of possible proposals be explored; a reasonable range ought to focus only on proposals possessing a minimum degree of acceptability and avoid wasting resources on analyses of alternatives which have flaws significant enough to exclude them from final consideration.

28-1(Cont.)

Any range of alternatives considered would need to at least meet the minimum standards for reclamation as currently understood by the Department of the Interior. As will be illustrated in more detail below, from the point of view of acceptable human health and safety risks, aesthetics, and the overall future productivity of the land, even the existing the Anaconda proposal (the least intensive reclamation alternative proposed) contains many problems and insufficiencies which make its adequacy questionable. A less extensive proposal (such as the 1985 Multiple Use Reclamation Plan recently introduced by Anaconda) would only fall further below the threshold of minimum reclamation acceptability.

Lease Requirements: The State of New Mexico presently assumes the duty of Anaconda Company to reclaim the disturbed areas at the Jackpile-Paguate uranium minesite, and accepts as valid the Department of the Interior interpretation of applicable leases and regulations as outlined in Chapter 1 of the DEIS. We reserve the right, however, to address this legal issue further should it become necessary. From a scientific and environmental point of view, we further support the reclamation objectives listed on page 1-10 of the DEIS as being reasonable and desirable criteria upon which to base assessment of any reclamation alternatives.

Specific Comments

Several professional staff members from State agencies have conducted expert reviews of the alternatives presented in the Jackpile-Paguate Uranium Mine Reclamation Plan. For the sake of brevity, many remarks below express the conclusions or expert opinions of state agency reviewers; staff may be contacted for clarification or background information regarding any statements made, and/or may elect to prepare more elaborate comments on any of these issues should it become necessary at some future date.

28-2

Radiological Health: Under the DEIS "No Action Alternative", there would be a 0.1 percent increase in the predicted cancer deaths over a ninety year period. Although relatively small, this still represents an additional 95 or 243 (under the absolute and relative risk models, respectively) additional cancer deaths over a ninety year period. The Environmental Improvement Division (EID) Radiation Protection Bureau believes this is an unacceptably high number.

The DEIS Anaconda, DoI and Laguna proposals all reduce the cancer risk to the public to less than 0.1% of the No Action Alternative, which is considered to be an acceptable risk.

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All the plans in the DEIS (other than No Action) call for covering radioactive source materials with four feet of overburden and one foot of topsoil, and for the re-establishment of vegetation (the degree varies with each proposal). The five foot depth would attenuate radon emissions to near background levels. The DoI and Laguna plans would require a 90% revegetation level, which would ensure longevity of the cover material. Any of these plans would be acceptable to the EID Radiation Protection Bureau from a radiological standpoint. The DoI or Laguna proposals are preferred because of more effective erosion prevention and therefor enhanced longevity.

We also support the DoI proposal to perform radiological surveys to ascertain that gamma, outdoor radon and indoor radon levels do not exceed twice background (3 pCi/l and .03 WL respectively) before final reclamation success is determined.

The recently proposed Anaconda Company 1985 Multiple Use Reclamation Plan for the Jackpile-Paguate Uranium Mine falls far short of the minimum necessary remedial action to achieve final reclamation. For example, the proposed cover of 12"- 18" on the protore and exposed Jackpile sandstone is inadequate with respect to the reduction of radon emanation or longevity. Barring 100% revegetation coverage (unlikely in the arid southwest) this small depth of cover will quickly erode away, allowing radon emissions to return to unacceptable pre-reclamation levels and further erosion to contaminate surface waters.

A considerable amount of expert testimony given on behalf of Anaconda Company at the September 11, 1985 public hearing in Albuquerque, challenged the information in the DEIS relative to radiological impacts on the population within a 50-mile radius of the mine, and argued that a much less extensive reclamation plan was therefore possible without a significant risk to human health and safety. One particular focus of criticism was the 1983 Momeni et al. study, Radiological Impacts of Jackpile-Paguate Uranium Mines -- An Analysis of Alternatives of Decommissioning. Beside contradicting some of Anaconda's own earlier studies and conclusions, several Anaconda statements at the hearing raised issues to which we must respond. For example:

(1) The UDAD and PRIM computer codes (used to estimate radiation dose and effect of radiation, respectively) were said to grossly overestimate dose and therefore public health risk. In fact, UDAD has been used by over 200 consulting companies, and was used by the NRC in a national evaluation on the impacts of uranium milling. "Mildos", a more recently developed code, is based on UDAD, and does incorporate some refinements such as time steps. However, UDAD can assess radiological doses from greater number of sources than can Mildos. Generally speaking, UDAD is still considered a valid tool for assessment of radiation dose.

(2) The risk coefficients used in the models, criticized as being too conservative by Anaconda witnesses, were taken from the National Academy of

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Science's BEIR III report. These estimates are in conformity with the estimates used by the U.S. Environmental Protection Agency. Other investigators have reported values both higher and lower than the BEIR III estimates. Offsetting any possible conservatism of the estimates used is the Quality Factor of 10 used in the UDAD code. The National Commission on Radiation Protection recommends the use of a quality factor of 20, thus use of the UDAD code effectively underestimates dose by one-half.

(3) Assumptions relating to occupancy and food ingestion used in the models, also declared too conservative by Anaconda, were used only to estimate the maximally exposed individual dose. These assumptions were not used to determine average dose commitment to the total population within a 50 mile radius.

(4) The estimate of the amount of exposed radioactive material at the site was considered overly high by Anaconda's expert witness. In the Momeni et al. report, estimates of the surface area of the radioactive sources were based on data from the Anaconda Company, the Department of Interior, an aerial gamma survey by EG & G, and aerial photography. The Anaconda expert witness, however, based her estimates of source area solely on aerial photography, identifying source area by the color of the rock. This limited review is not sufficient to contradict the previous, much more thorough assessment.

Overall, we believe that the data provided on radiological health in the DEIS, including that from the Momeni et al. report, is acceptable and accurately estimates the relative radiological health risks associated with the various alternatives proposed.

Surface Water Quality: We have several concerns regarding surface water protection in the mine area.

Both the DoI and Laguna proposals require five feet total cover on waste piles containing Jackpile Sandstone and protore, and involve the removal of all protore and waste material within 200 feet of the Rios Paguete and Moquino. Both plans would armor arroyos downstream of the protore and waste piles to prevent headcutting. All slopes of the waste and protore piles would be contoured to a 3:1 slope, without terracing, minimizing erosion processes. The sum effect of all these measures would be to minimize any contamination of the Rio Paguete, radiological or otherwise, which is used for irrigation and stock watering by the Village of Mesita and other Laguna people downstream. The DEIS Anaconda proposal also provides for five feet of cover and a minimum 200 feet distance between the rivers and the protore and waste material. However, this proposal would require only short term arroyo armoring, and would allow some waste dumps to have slopes less than 3:1. Neither of these provisions is considered acceptable for erosion control. We also prefer the more stringent revegetation requirements of the DoI or Laguna proposals. The degree of regenerated ground cover is critical to the control of erosion throughout the mine area, and should be assured through five or

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ten year monitoring and a guarantee that 90% revegetation has been attained. Overall, we therefore support either the DoI or Laguna proposal for the protection of surface water quality.

The recently submitted Anaconda 1985 Multiple Use Reclamation Plan contains many elements which are entirely unacceptable to the State of New Mexico. For example, as mentioned above, the 12" to 18" cover on exposed Jackpile sandstone and waste piles is not sufficient to protect surface water quality or public health.

Anaconda's consultants (Hydro-Search 1979) found that above the confluence of the Rio Pagate with the Rio Moquino, the Rio Pagate is an effluent watercourse, recharging the Jackpile Sandstone, which then discharges into the pits. Under Anaconda's plan, water from the Rio Pagate, local surface runoff, and discharge from the Jackpile Sandstone will be allowed to form a reservoir for stock watering in the North pit. Any contamination in this water, radiological or otherwise, will be concentrated by evaporation, before being consumed by livestock. Page 2-47 of the DEIS states that no radiological analysis of meat from locally raised animals has been done. However, a recent study by the New Mexico Environmental Improvement Division (Lapham et al. 1985) found that cattle grazing in the Ambrosia Lake Region (a region with intense uranium mining activity) and along the Rio Puerco had concentrated radionuclides in edible body tissues. Hence, consumption of meat from cattle utilizing the proposed reservoir could contribute unnecessarily to human dose commitment. The new Anaconda proposal is therefore unsatisfactory as it fails to reduce radioactive emissions for a reasonable period, does not protect surface water from further contamination, and unnecessarily contributes to the radiological dose of the population.

This plan also states that protore will be relocated away from the stream area but does not indicate any specific distance. If this distance is to be the 50 feet distance mentioned in reference to the removal of Jackpile sandstone and overburden, it is not satisfactory. All waste material should be moved to a location where washouts are a very remote possibility. Ephemeral streams are prone to extreme channel changes during flood events, and we question the claim that 50 feet is sufficient to protect against a 100-year flood event. We maintain that the 200 feet distance proposed in all the original DEIS proposals (including Anaconda's) is a safe and reasonable distance to protect against floods.

The new Anaconda proposal also states that overburden dump slopes located in closed water basins would not be topsoiled and would be left at the angle of repose. This would make revegetation and stabilization very unlikely at these dumps, and contribute to the possibility of excess erosion. We recommend a minimum of 3:1 sloping on all dumps at the minesite, with adequate cover and revegetation efforts.

Ground Water Quality: The primary concerns of the State of New Mexico regarding ground water protection are the requirement for sufficient backfill

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levels to prevent ground water ponding in the pits as well as any long-term contamination of the aquifer once ground water recovery levels have been attained. There is sufficient scientific uncertainty surrounding both these issues to make any statements about optimum backfill levels to prevent ponding or contamination of soils or intermittent water in pit bottoms highly speculative at best. For this reason, any approved reclamation plan for the minesite should have a strong emphasis on long-term monitoring of ground water quality. This is necessary to insure that when and if contamination or ponding do occur, they are identified early and addressed with appropriate remedial action.

28-3 | None of the proposals in the DEIS provides sufficient information regarding a ground water monitoring plan. We are especially concerned about the length of time monitoring will be required. Experience in coal mining reclamation projects in the western United States suggest that three, five or even ten year monitoring period will be insufficient to allow for evaluation of long-term ground water quality and quantity trends. Resaturation of backfill to ground water recovery levels at the Jackpile site is necessary to know if any problem does in fact exist, and is likely to take at least 100 years. Because of the long periods of time in question, we prefer the DoI Monitoring or Drainage options, since they appropriately base their backfill requirements on a long-term performance standard and allow for a monitoring schedule "of sufficient duration to determine the stable future water table conditions" (page 1-19).

Under Anaconda's DEIS alternative, up to 200 acres of intermittent ponds would develop in the pit bottoms. Should ponding occur, there is little doubt that water and sediments contained therein will contain concentrations of radionuclides and trace elements which could have deleterious health effects if ingested by wildlife, livestock or humans. Owing to the clear long-term hazards associated with that condition, the proposal is unacceptable. If the proposal is implemented, however, a performance bond should be mandated in order to facilitate any subsequent related remedial action.

28-4 | In addition, there is one technical correction which should be made in the ground water section of the document. On page 2-53, Table 2-26, the EPA standard for Ra-226 should read 5.0 rather than 15.0.

Non-radiological Air Quality: Any of the proposals outlined in the DEIS (other than No Action) are acceptable as far as protection of non-radiological air quality is concerned. The No Action alternative would allow occasional violations of state and federal TSP levels, and is unacceptable to the Environmental Improvement Division's Air Quality Bureau.

28-5 | Stabilization: The DoI proposal for reducing the vulnerability of highwall failures is considered the best approach. However, a monitoring mode as proposed by the Laguna Tribe would create a surveillance capability for early detection of highwall failures and provide for corrective action to reduce the vulnerability of highwall failure.

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28-6 | Cultural Resources: As stated in the DEIS, there are 217 known archaeological sites which have been inventoried in the Jackpile-Paguate mine lease area, 205 of which remain. Prior to implementation of any reclamation plan, the State Historic Preservation Office should be consulted to ensure compliance with the provisions of 36 CFR 800.

28-7 | Cost Estimates: We question the accuracy of overall reclamation cost figures given for the various proposals on page 1-31 of the DEIS. Given the fact that the majority of reclamation cost is attributable to earth moving activities, large differences among alternatives in the amount of material to be moved should result in a much greater disparity among the costs encountered than is reflected in these estimates. This is particularly true of the Anaconda proposal relative to those of the DoI and Laguna Pueblo. These cost figures should be recalculated to more accurately indicate the real costs of each proposal.

Further, a variety of proposals exist for specifying techniques for placement of protore back into the open pits. The method of placement (waste-burden as first level of coverage versus protore to facilitate future potential recovery for processing) has a major financial impact on reclamation. A glut of uranium exists on the world market and projected world-wide production capacity far exceeds uranium demand requirements through the year 2000 and beyond. The economic feasibility of processing protore in the foreseeable future is questionable based on ore grade quality in the range of .002 to .019 percent U₃O₈. A balancing of reclamation costs (placing protore initially within the pits versus placement of over-burden material above the groundwater recharge level with protore stacked above is warranted, especially in light of negligible future economic gains due to the competition presented by Canadian and Australian high quality ore reserves.

Even in the event the projected economic uncertainties prove incorrect, the subsequent removal or protore would degrade reclamation accomplishment and necessitates further costly reclamation action by the Laguna Tribe. This places future processing or protore at a further market disadvantage.

The deeper burial aspects of placing protore at the base of pits is also preferred due to enhanced radiological protection measures relative to radon emission and particulate dispersal and reduces the likelihood of potential erosion into surface waters.

Thank you for the opportunity to comment on this document. If you have any questions, please call Susan Tixier of the State Clearinghouse for Environmental Review, at 827-3109.

Sincerely,



TONEY ANAYA
Governor

TA:spm

RESPONSES TO WRITTEN COMMENTS

- 1-1 The Jackpile-Paguate uranium mine would be closed to public access during reclamation. Pueblo of Laguna law enforcement personnel would have the responsibility for protection of cultural resources upon the completion of reclamation.
- 3-1 We agree that filter cloth is important to the design and function of loose rock dams. Figure 3-6 in the DEIS was intended to illustrate a typical design and should have included filter cloth. Figure 3-6 has been modified in the Final EIS (FEIS) to include filter cloth.
- 5-1 The public scoping process was used to identify those issues associated with reclamation of the Jackpile-Paguate uranium mine. The criteria DOI used for selecting major issues to be evaluated is explained on page 1-7 of the DEIS. This approach to issue identification and evaluation was used to formulate the scope, alternatives and impacts to be addressed in the EIS.
- 6-1 This information is contained in Table 4.1 of ANL/ES-131, a support document to the EIS. This table shows that there are 1,150 people within a 1-mile radius, 1,600 people within a 5-mile radius and 359,000 people within a 50-mile radius of the Jackpile-Paguate minesite.
- 6-2 Anaconda does not propose to conduct any blasting under their new 1985 Multiple Land Use Reclamation Plan.
- 6-3 Procedures for calculating the health impacts for each of the alternatives was described in Appendix D, Section D.1 of ANL/ES-131.
- 6-4 The statement has been revised to read "since all radiological material would be covered with uncontaminated soil there would be no health impacts from radioactive particulates".
- 6-5 Enforcement of reclamation restrictions will be by and through applicable laws and ordinances of the Laguna Pueblo, laws and regulations of the Department of the Interior, and through specific instructions and requirements to be imposed upon future reclamation contractors.
- 6-6 Health impacts to workers is discussed in Chapter 3 (radiological section) of the FEIS.
- 6-7 Realignment work on State Highway 279 has been initiated. This project will probably be completed before reclamation begins. The highway will be temporarily closed during reclamation operations.
- 6-8 Radiological decontamination procedures for minesite buildings will follow the methods described for area and material decontamination on pages 198-203 of the Radiological Health Handbook (1970). Radiological cleanup criteria will be those specified in the Code of Federal Regulations (10 CFR) for the release of materials and buildings for unrestricted use.

- 6-9 The Pueblo of Laguna has provided additional detail on their reclamation plan which indicates that the majority of protore would be placed within the saturated zone. Therefore, the impacts would be the same as DOI's Monitor Option.
- 7-1 None of the EIS alternatives suggested deliberate discharge of fill into or modifications of the Rios Moquino and Paguate. However, some accidental discharges may occur during reclamation. Natural erosion may also result in contribution to sediment loads which is discussed in the EIS. DOI believes none of the alternatives would require a permit under Section 404 of the Clean Water Act (33 USC 1344).
- 8-1 Points raised in this letter were superseded by comment letter 10. Refer to this comment for corresponding Departmental responses.
- 9-1 The geology section has been revised to reflect current stratigraphic nomenclature in the Jackpile-Paguate minesite. The geology section of the EIS is not intended to be a comprehensive treatment of the geology in the area. For a detailed explanation of the geology in the area, interested readers should refer to the cited references.

The EIS did not arbitrarily reject the long-term use of remaining mineral resources in order to deal with health hazards. As stated in the EIS, additional mining or heap leaching of the protore is not considered viable at this time or in the foreseeable future.

We agree that the Green Book and Anaconda's 1985 Multiple Land Use Reclamation proposals to loosely dump cobble and gravel in headcuts is not a long-term solution to arroyo headcutting. Placing unsorted materials in gullies usually initiates erosion in adjacent areas. The loose rock check dams, as proposed by the DOI (both options) and Laguna reclamation alternatives, have been widely and successfully used in the western U.S. by the USDI Bureau of Land Management, USDA Soil Conservation Service and Forest Service. These agencies have many years of research and experience in using rock check dams.

- 9-2 As stated in the EIS, the volume of leachate generated by groundwater flow through the backfill cannot be accurately predicted. Initially, background conductivity values will approximately double. As the backfill resaturates, less leachate will be generated as dissolved oxygen is depleted and equilibrium conditions are established (Dames and Moore 1983). Based upon the potentiometric surface contours of Zehner (1985), leachate would migrate downgradient from the pits toward the Rio Paguate below its confluence with the Rio Moquino. The hydraulic conductivities of the Jackpile Sandstone and the alluvium are about 0.3 feet per day and 22 feet per day, respectively. These values can be interpreted as rates of movement of leachate without absorption, cation exchange or other retardation factors taken into account.
- 9-3 Reclamation costs would be one of the factors considered in selection of an alternative for implementation.

The radiological health impact analysis has been revised in the FEIS. In dealing with any environmental impact, including exposure to radiation, it is important not to minimize the potential problem over a large area and/or population. It is likely that people living closest to the minesite would experience a greater impact, percentage-wise, from exposure to radiation than the regional population. The probable error of the radiation induced cancer death estimates was given in ANL/ES-131 as not less than ± 2.5 times. This estimated uncertainty has been revised to ± 3.5 times in the FEIS.

- 9-4 Dames and Moore (1983) evaluated the potential for dispersion of toxic elements in the reclaimed pits. They concluded that although "some increase in dissolved solids may unavoidably occur, these should have negligible impact upon viable ground or surface water resources". Heavy metals, including arsenic, are not expected to exceed EID standards in the backfill. Argonne National Laboratory (1983) concluded that radium migration may be 2,000 meters in 1,000,000 years, with retardation taken into account. The EIS lists those elements which exceed National or State drinking water standards. It was decided to publish data on those critical elements instead of the longer, more comprehensive list which is available on file.
- 9-5 Your views are noted.
- 9-6 The background gamma exposure rate of 13 $\mu\text{r/hr}$ was determined by the Energy Measurements Group of EG&G (Jobst 1982) and is a reasonable pre-mining background level for areas away from the limited outcroppings of ore.
- 9-7 As stated in the DEIS, improved market conditions, better technology or different economic circumstances could dictate future recovery of remaining ore reserves. However, this is speculative. Reclamation at this time would probably increase the costs of recovering remaining uranium resources but would not present an absolute bar to future recovery.
- 9-8 Loco weed is not included in any of the proposed seeding mixtures but it may naturally invade the minesite.
- 10-1 The Office of the Field Solicitor, U.S. Department of the Interior, Santa Fe, New Mexico, which serves as legal counsel to the Bureau of Land Management and Bureau of Indian Affairs, is not in agreement with Anaconda's legal position as stated.
- 10-2 The environmental impacts of Anaconda's 1985 Multiple Land Use Reclamation Plan have been analyzed in the FEIS.
- 10-3 It is not possible to assess quantitatively all of the risks present at the minesite. Although the individual risk probabilities are low, the combination of all risks do pose a hazard to the public. The combination of such conditions do not exist offsite.

- 10-4 The radiological analysis and conclusions in the EIS have been extensively reviewed and corrections made where warranted. The exposure calculations and dose rates are generally found to be correct. DOI believes that its calculations are reasonable with regard to potential public exposure levels. A typographical error was made in converting the dose rates to health effects which resulted in higher estimated cancer rates. The errors have been corrected and corresponding changes made in the text. DOI recognizes that there are differences of opinion among professionals in regard to radiological health impacts but we believe our analysis and conclusion are reasonable.

The EIS technical coordinator provided information on radiation and air quality components in Chapter 2 (Affected Environment). The radiological health impact analysis was prepared by Argonne National Laboratory under contract through the U.S. Department of Energy.

- 10-5 The revisions made to the radiation section of Chapter 3 of the FEIS adequately address the concerns raised by Anaconda Minerals Company. The comments represent a difference in approach and methodology rather than significantly new information.
- 10-6 The various technical and environmental issues and concerns that were brought out during the 1981 public scoping meetings served as the basis in formulating the range of alternatives in the EIS. We believe that a reasonable range of alternatives were identified and considered for decision making.

The 1981 scoping meetings determined that the primary post-reclamation land use would be livestock grazing. Specifically excluded were habitation and farming. The prospects of developing remaining or reserves have been adequately discussed in the EIS (see response to comment 9-7). Other post-reclamation land uses proposed in Anaconda's 1985 Multiple Land Use Plan have also been analyzed in the document.

- 10-7 The Green Book Plan (Anaconda's former reclamation proposal) indicates on page 28 of Volume I that blasting may be used as an alternate method of stabilizing the Jackpile Pit highwall (i.e. Gavilan Mesa). The use of blasting, as an alternate method of stabilization, is also indicated on plate 6.1-3 in Volume II of the Green Book Plan.

The information presented on page 1-14 of the EIS consists of those measures proposed under each reclamation alternative. It is noted that the North Paguate pit highwall (close to the Village of Paguate) is presently fenced (page 2-21 of Chapter 2, Affected Environment, EIS).

Table 2-8 of the DEIS shows highwall safety factors (under present conditions) as calculated by both the DOI and Anaconda. To provide a common basis for comparison, DOI independently analyzed highwall stability for all reclamation proposals. The results shown in Table 3-1 of the DEIS were clearly labeled as being DOI's calculations and did not misrepresent the safety factors determined by Anaconda.

10-8 The range of post-reclamation waste slope geometries cited on pages vi, 1-11, 3-9 and 3-10 of the DEIS were taken from the 1982 Green Book Plan, Volume 1, Tables 6.1-1, 6.1-2 and 6.1-3. The pages cited in the DEIS gave the range of post-reclamation geometries. Individual post-reclamation waste slope configurations are described for each reclamation proposal in Table 1-4 of the DEIS.

10-9 Table 1-3 (Waste Dumps and Surface Preparation) and Figure B-1 (Waste Slope Modifications) of the DEIS clearly describe the erosion control measures proposed in the Green Book Plan.

The FEIS has been revised to remove the reference to buttressing the toe of waste dump FD-2.

The EIS properly interpreted the proposed terrace design in the Green Book. Differential erosion on the dump slopes and deposition on the terraces would result in blockages to lateral flow and ponding of water between the berm and the dump slope. The piping consequences and subsequent direct downslope flows depicted in the EIS would then occur.

10-10 Every effort was made throughout the EIS process to provide all interested parties with sufficient information relative to the DOI and Laguna reclamation proposals. The DEIS provided enough information for the public to understand the alternatives and corresponding impacts. Support documentation, background reports, and engineering design are on file and available for public inspection at the BLM Albuquerque District, Rio Puerco Resource Area Office.

10-11 See response to comment 10-10.

10-12 See response to comment 10-10.

10-13 DOI made extensive analyses of waste dump stability, waste dump slope erosion, geomorphic site stability, radiological health impacts, site hydrology, revegetation success criteria, material volumes and used the information obtained to develop the DOI alternatives. All reports and data are available for public inspection at the BLM Albuquerque District, Rio Puerco Resource Area Office.

10-14 Highwall safety factors computed by Anaconda are the result of using significant values of cohesion. For long-term stability analysis, it is standard engineering practice to assume cohesion equal to zero. Therefore, Anaconda's reevaluation (Seegmiller 1985) cannot be described as using "extremely conservative assumptions". The EIS team independently evaluated highwall stability using information provided by Anaconda and we see no reason to change our conclusions.

10-15 In response to comments by Anaconda's consultants regarding radiation, DOI has reviewed the radiological analysis in Chapter 3 of the DEIS. This review indicated that the DOI's estimate of radiation release and corresponding dose rates were reasonable and within the range cited in

the literature. The analysis of health effects has been revised. See individual responses to Hamilton, Chambers and Lowe, and Hersloff for more details (see responses 10-30 through 10-52).

- 10-16 The radiological characteristics of the minesite described in Chapter 2 are based on information provided by Anaconda. Table 2-13 of the EIS has been revised to reflect detailed information provided by Anaconda on June 16, 1982. This information provides the basis for the radiological analysis in Chapter 3.

The residence time of uranium in the body and its subsequent contribution to the radiological dose was considered in the UDAD Code in preparing the radiological analysis.

- 10-17 The EIS is correct in identifying areas south of Y, Y2, and I dumps and west of FD-3 dump as subject to headcutting. Although a large part of the drainage basin above the Y, Y2, and I dumps has been cut off due to emplacement of waste dumps, headcuts south of Y, Y2, and I dumps have remained active due to localized water flows. During the winter of 1986, headcuts in this area breached the road at the base of Y, Y2, and I dumps. The headcuts west of FD-3 dump has a substantial drainage basin above it and is susceptible to further movement.

Anaconda has armored at least two headcuts at the mine: one north and west of A and B dumps, and another near the airstrip. Photographs and discussion of this past armoring effort are included in a background analysis prepared for the EIS by Gregory W. Smith entitled "Evaluation of Anaconda and Task Force Plans for Control of Headcut Movement at Jackpile-Paguete Mine, Cibola County, New Mexico".

The EIS is correct in concluding that Anaconda's matting and special seeding techniques were unsuccessful. Severe erosion by rills and gullies occurred both on slopes subjected to such special techniques and on untreated slopes.

- 10-18 The EIS correctly states the present condition of the underground openings and the reclamation alternatives. Various underground entries are open (i.e. not backfilled), however, we note that they do have barricades to prevent access. The text is corrected to show that these entries are barricaded.

The EIS never stated that the P15/17 had been mined or had any development work done to it. It states that, under the No Action Alternative, the mineral resources in P15/17 are accessible, i.e. access is not being hindered. Additionally, the EIS did state that the P15/17 mine was approved. On April 21, 1978 the United States Geological Survey Conservation Division, now part of the Bureau of Land Management, approved mining operations for the P15/17 mine. The Pueblo of Laguna and Bureau of Indian Affairs concurred in this approval.

The DEIS also stated that all other mine openings (i.e. adits) not previously plugged would be backfilled. This would include the H-1 and NJ-45 adits. Specifics for sealing the adits and P-10 decline is included in the FEIS. The FEIS has also been changed to show that the P-13 workings are flooded.

The EIS states that as of December 31, 1983, subsidence of 3.37 inches has occurred over the 1,500 area of the P10/7 mine. This was based on the quarterly subsidence monitoring which Anaconda Minerals Company performed and submitted to BLM. This information was based on survey data and represented as accurate by Anaconda. The subsidence report is now being submitted semi-annually and, as of January 7, 1986, shows those stations with the subsidence as still being surveyed. This report shows maximum subsidence over the 1,500 area as 3.55 inches.

10-19 See response to comment 10-15.

10-20 The DOI is not attempting to devise or set nationwide radiological standards for uranium mine reclamation. We believe the suggested criteria are reasonable reclamation goals for this project.

10-21 See response to comment 6-9.

10-22 According to volumetric information calculated by DOI, on each of the alternatives, there is a 15 million cubic yard difference in total material moved between the Green Book proposal (38.7 million cubic yards) and the Laguna proposal (53.6 million cubic yards). The Laguna proposal costs only \$3.3 million more because a higher percent of the total material moved is being moved with scrapers and dozers (41 percent scrapers and dozers, 59 percent truck); whereas with the Green Book proposal a higher percent of the total material moved is being moved by truck (24 percent scraper and dozer, 76 percent truck).

10-23 The professionals who prepared the costs for the EIS are confident with the methodology used and the figures generated. Other than statements made by Anaconda, no information has been submitted to cast doubts on the methodology used or to point out any significant errors made. DOI has a high degree of confidence in the volumetric data generated and feels that it conscientiously responded to all informational requests by Anaconda. Also refer to DOI's individual responses to Morrison-Knudsen and Kelsey (10-54 through 10-59) for further substantiation.

10-24 The higher safety factors computed by Anaconda are the result of using significant cohesion (see response to comment 10-14). There may be practical difficulties in modifying the Gavilan Mesa highwall to approximate the natural slopes in the area. Small isolated rock falls at the minesite would be similar to those from natural cliff faces in the area and are not considered a serious hazard.

10-25 For long-term stability, slopes should be designed on the basis of residual strength (residual cohesion is generally assumed to be zero for both soil and rock). The analysis of waste dump stability in the Chapter 3 of the DEIS was correct. Also refer to DOI's response to Seegmiller.

10-26 Anaconda is correct in its assertion that the figure of 27 tons of radioactive U₃O₈ entering streams is too high. This figure is the result of a typographical error and has been changed to read "27 tons of material of 0.00 to 0.02 percent U₃O₈ will enter streams." The same correction was made under the No Action, DOI and Laguna proposals. Surface sheet erosion is only one agent involved in this process. Gully and rill erosion, along with transport by stream channels, are involved as well. Additionally, the fact that all protore would be placed in closed basin pits (under the Green Book plan) was taken into account in the calculations. The grade of material involved in the calculations was 0.00 to 0.02 percent U₃O₈. This, by definition is lower grade material than protore (0.02 to 0.059 percent U₃O₈) and represents the range of mineralization in the Jackpile sandstone remaining outside the pits. Lastly, the calculations leading to the conclusion that 27 tons of material will enter streams specifically excluded erosion from closed basin areas.

Erosion from all areas draining into closed basins was eliminated from calculations of sediment yield to streams. This was done by using a sediment delivery ratio of 0 to apply to all slopes draining into closed basins.

The DOI Drainage Option was specifically designed to avoid concentrating overland flow and the corresponding erosive energy too quickly into channelized flow. In combination with other specific engineering details (data on file at BLM Albuquerque District), it is expected that there will be minimal runoff and sediment yield to the streams.

All armoring designs are susceptible to failure. However, the type and design of the DOI proposal has repeatedly shown resistance to undercutting and piping failures. Loose rock check dams with filter cloth have several advantages over other types of headcut structures. Their ability to relieve pressure by slowly passing water through the structure and self-adjusting to foundation settlements prevents piping and undercutting. In contrast, the large uncontrolled voids created by loosely dumping unsorted material usually develop high velocity water jets that accelerate erosion within and adjacent to the fill.

All conclusions made in the DEIS regarding slope erosion are based upon accepted calculation procedures, direct observation, or consultation with objective third party experts.

10-27 A 90 percent revegetative success level would better reflect successful reclamation of mined lands and stabilization of the reclaimed sites. It is possible that revegetated areas may exceed 90 percent of the

native reference areas within 5-10 years if the 70 percent success criterion is met within 3 years. However, since it is expected that the reclaimed minesite will eventually receive limited use, successful revegetation and erosion control must be assured.

The CSA Method is recommended not because it is unaffected by environmental factors, but due to its applicability to semi-arid southwestern ecosystems. The methodology incorporates the use of an importance value (IV) for monitoring vegetation. The IV is the sum total of 3 parameters and, as such, provides a more sensitive measure of vegetative response than the measure of a single parameter.

DOI does not consider the vegetative parameters of foliar and basal cover to be duplicative. These parameters, along with additional data supplied by the CSA method, would ensure a complete data base for plant community comparisons. The parameters collected under the CSA method would then be used to calculate an importance value and diversity index.

- 10-28 The format and procedures used in preparing the EIS were in conformance with National Environmental Policy Act (NEPA) regulations (40 CFR 1500-1508), Council on Environmental Quality (CEQ) guidance and Departmental guidelines.
- 10-29 There has been no new significant information presented which would require a new draft EIS or publication of a supplemental. The comments received on the document, for the most part, represent a difference in approach and methodology rather than significantly new information. The DOI feels that the data presented and methodology used in the EIS are fully adequate to support the analysis of the potential impacts that could occur under each reclamation proposal. The No Action Alternative was evaluated.
- 10-30 In ANL/ES-131, it was explicitly assumed that the cancer incidence coefficients and the mortality coefficients were equivalent. For most diseases, mortality would be smaller when the disease is detected early and medical therapy is administered. The ratio of mortality to incidence is variable; it is dependent on socioeconomic class and it changes with time. The assumption of equivalence between cancer mortality and incidence may be conservative for most populations, but at this time it may be a realistic assumption for the immediate population of the Jackpile-Paguate minesite.

Chapter 4 of ANL/ES-131 has been amended. The sum of mortalities from the causes identified in Table 4.7 (absolute risk model) was adjusted to 14.9 cases. Leukemia and bone cancer estimates were eliminated from the analysis using the relative risk model (Table 4.8). The cause (CA-8) was corrected to 1.3 mortalities in 85 years [0.2 cases in 5-year period ($0.2/5 = 0.044$ per year).] The cause CA-10 (all the other causes) was not calculated for the relative risk model because the risk coefficients and natural incidence rates were not available.

The linear component of the risk coefficient for leukemia is between 1×10^{-9} to 5×10^{-10} per year per mrem; its delay period is 2 years and its expression period is 25 years.

The risk coefficient for bone is between 5×10^{-11} and 2.8×10^{-10} ; its delay period is 2 years for ages younger than 15, 10 for ages older than 15, and its expression period is 30 years.

Average doses to bone marrow and bone from inhalation, ingestion and external irradiation were calculated. The average doses to bone and bone marrow are approximately equal.

Thus, if incidence of osteosarcoma is feasible as stated by the reviewer, then the incidence of leukemia is even more feasible. The larger risk coefficient for leukemia would result in a prediction of higher incidence of leukemia than osteosarcoma; the ratio of the two diseases would be approximately equal to the ratio of the risk coefficients.

Cancer mortality for the cause CA-8 (kidney, sex organs and urinary organs) was predicted to be 0.7 cases (absolute) and 1.3 cases (relative) in a population of about 487,000 persons over 85 years. One hundred and thirty-six cancers for cause CA-8 were erroneously reported in Table 4.8 of ANL/ES-131. The error resulted from using percent natural incidence in the calculations.

After correction for CA-8 (Table 4.8 of ANL/ES-131) to 1.3 cases, the data suggests that the leading cause is lung cancer; whereas, the data in Table 4.7 suggest the leading cause is stomach cancer.

A revised estimate based on an adjustment of the incidences to mortalities (amendment to ANL/ES-131) indicates that the leading causes of death is leukemia using the absolute model whereas lung and intestinal cancers are the leading causes using the relative risk model. The uncertainty in these risks is at least a factor of 5. Cumulative incidence for both models is dependent on risk coefficients. The relative risk model is also dependent on spontaneous incidence, an age and time dependent parameter (Figure V-2 BEIR 1980).

Predicted risk for any of the diseases is dependent on the value of its risk coefficient. An examination of the data in Tables V-19, V-20 and V-21 (BEIR 1980) indicates a direct association between the risk coefficients and the predicted death rates. Presently, selection of a model and its risk coefficient may reflect an educated but somewhat subjective choice.

Risk estimates using the relative risk model are dependent on the natural incidences. A high natural incidence results in a higher radiation-induced risk. Since the risk coefficients reported in literature for both models are not normalized to all causes and natural incidences, discrepancies between the two models is expected. In order that the models agree with each other, a normalization of the risk coefficients and the natural incidence rates is required. Lack of agreement between the two models, if both are applicable models, reflects our difficulty in selection of these parameters.

Another source of difficulty stems from the analyses reported in BEIR (1980). BEIR (1980) predictions for the two risk models are based on 1 rad/yr exposure. In ANL/ES-131, the risks are based on organ doses; the organ doses are not equal. In addition, BEIR (1980) does not provide number of deaths from each of the causes and for each of the risk models. BEIR (1980) is based on two disease groups (leukemia and bone vs. all the other cancers). A comparison of the BEIR (1980) total predicted death from all causes (except leukemia and bone) with the prediction in ANL/ES-131 would result in an erroneous conclusion. Partially the erroneous conclusion is due to the pattern of the dose distributions.

Inhalation of airborne materials is dependent on particle size distribution. The particle size distribution in ANL/ES-131 are comprised of larger particles (ANL/ES-131, Page D8). The deposition pattern of these particles are different than inhalation of submicron particles. Particles larger than 10 micron would deposit mainly within the nasopharyngeal region. Also, significant fraction of the larger particles are ingested subsequent to desposition within the upper respiratory passages. The dose from the ingested fraction is to the digestive system. Thus, risk of radiation dose from inhalation not only includes lung, lymph nodes, bone, bone marrow, kidney and bladder; but it also includes stomach and intestine. Thus, comparison of the pattern of radiation-induced mortality based on these analyses with those from either a single external exposure or a constant value of a dose to all organs is fraught with difficulty.

- 10-31 See response to comment 10-30. Attachment C of Dr. Hamilton's comment provides an estimate of the excess cancer mortality rate per year at Paguate. Two hundred person - rem/year is not shown in this attachment. Attachment C identifies the source of data as ANL/ES-131, pages 3-41 through 3-43. The pages cited do not identify 200 person - rem/year.
- 10-32 MILDOS is based on an earlier version (UDAD Version IV, 1976) of the UDAD code. UDAD version IX (published in 1979, NUREG/CR-0553), was used by the U.S. Nuclear Regulatory Commission in the Generic Environmental Impact Statement on Uranium Milling (NUREG-0706, 1980). Both codes were available in 1980 but NRC chose to use UDAD IX for their most comprehensive analysis of uranium milling impacts (NUREG-0706) in place of UDAD IV (MILDOS) [Also see V.III of NUREG-0706 and NUREG/CR-2011].

Methodology for calculation of airborne concentrations, dose from the inhalation pathway, and external doses are identical in UDAD and UDAD IV (MILDOS).

MILDOS is a simplified version of the UDAD code with fixed input parameters for many pathways. The fixed input parameters standardized the code output for application to the licensing process; it also reduced the UDAD printed output.

Methodology for calculation of dose and time-integrated doses in UDAD, both necessary for risk analysis, were not incorporated in MILDOS.

UDAD has been modified 11 times since its creation in 1976; its recent version (XI) contains the latest applicable dosimetry models. Each modification was based on incorporation of recent data and methodologies.

No code is a perfect entity. At best it reflects the state of knowledge and available data. The structure of UDAD is based on available data, needs, and practicality of the modeling process.

The UDAD authors attempted to incorporate any practical advancement available prior to 1982 in the UDAD structure.

- 10-33 The Momeni and Zielen (1982) paper or its conclusions were not used in ANL/ES-131.
- 10-34 An absence of a reported dose (blank) does not suggest a zero dose. The external dose to the stomach or upper or lower large intestine is approximately equal to the dose to the small intestine. Similarly the dose to breast is not included in Tables 3.13 and 3.14. However, this does not mean the dose is zero. The column designated as "total" is only the total for the doses assigned to selected pathways. The external doses are approximately equivalent for upper and lower large intestine.

The text of ANL/ES-131 has been amended to clarify the meaning of "total" as used in Tables 3.13 and 3.14.

- 10-35 The ratio WL/Rn concentration is dependent on distance to the source (equation 3.2, page 14 in NUREG/CR-0553). Dose to the bronchial epithelium was a summation of doses from periods of time an individual resided in a house and outdoors. The contribution to the dose from indoor occupancy was based on a fixed radon-radon daughter equilibrium concentration, whereas the ratio of radon concentration to WLM is dependent on the transit time from the source to the receptor. The transit time is an inverse function of the wind velocity at a given time. Each of the towns are located at a different distance and in a different direction from the minesite. The wind speed distribution is different for different directions. The contribution of outdoor dose (dependent on the radon concentration) is dependent on the distance and windspeed (see NUREG/CR-0553, pages 6 and 13). Thus, the ratio of the dose to the bronchial epithelium to WLM is not constant under these conditions.

The results given in Table 3.10 of ANL/ES-131 are correct.

Also see page 63 of NUREG/CR-0553 (Radon Dosimetry) and response to comment 10-46.

10-36 See the report prepared by SENES.

The dose rates from inhalation of particulates is 5.1 mrem/yr by SENES and 0.22 mrem/yr by Momeni et al---about 23 times larger. The dose rate from inhalation of radon and radon daughters is 0.012 WLM/yr by SENES and 0.0053 WLM/yr by Momeni et al---about 2.2 times larger. Ingestion doses are equivalent from both calculations. SENES consultants suggested an external dose rate of 0.01 mrem/yr; whereas the value in ANL/ES-131 is 7.2 mrem/yr. However, in their calculations SENES's staff ignored contributions from Bi-214 and Pb-214 radionuclides. After correction for their omission, their value should also be equal to those in ANL/ES-131.

Thus, based on comments of other responsible professionals, ANL/ES-131 is underestimating the doses in two significant areas: in dosimetry of radon and inhalation of particulates.

The airborne concentration of radon was calculated using both UDAD code and the ISC code [Industrial Source Complex (ISC) Dispersion Model User Guide, Environmental Protection Agency, EPA report 450/4-79-030].

A comparison of the concentrations calculated from the two models, UDAD and ISC (ANL/ES-131, Table 3.4), indicated that with identical meteorological conditions and release rates "...the ISC code calculations are 20 percent higher than those for the UDAD code." Thus, the dispersion of radon is underestimated based on this EPA code.

The predicted concentrations are based on reasonable methodology considering the available input data.

The method of dose calculation incorporated in UDAD were based on the most recent data and techniques available during preparation of ANL/ES-131. The models were those recommended by the International Commission of Radiation Protection (ICRP 10A,2) and NRC Regulatory Guide 1.109. The inhalation pathway was based on a model developed by a Task Group on Lung Dynamics for Committee II of ICRP. The external doses were calculated based on dose conversion factors listed on page 37 of NUREG/CR-0553.

In conclusion, the estimated doses were in accord with the established procedures.

Radon specific flux of $2.2 \text{ pCi/m}^2 \cdot \text{sec}$ per pCi/g radium from ore piles at other mine sites has been documented (a value about 5 times higher than those utilized for ANL/ES-131). Thus, the assertion that the radon source term is overestimated by a factor of 1.6 is not supported by values reported in literature (see the author comments to ANL/ES-131, Appendix C).

10-37 See response to comment 10-36.

- 10-38 Although these types of comparisons are often used, they are misleading in that most of the risks are derived from actual statistics whereas the health risks from this project are based on estimates.
- 10-39 All doses are in mrem (e.g. Figure 3.23 and Table 3.9 of ANL/ES-131). Thus, by the definition of rem, the doses from high-LET radiation are normalized by their quality factor to low-LET radiation. Separation of doses to gamma, beta, alpha from each radionuclide is technically feasible, but not necessary. For radiation protection, all doses are based on a single unit - mrem.

The reviewer further reduced all external doses by a factor of 2.5. Neither NRC or BEIR (1980) has suggested such a reduction. All doses identified in ANL/ES-131 are normalized by the radiation quality factors. The doses are already equivalent to low-LET radiation. Thus, the reduction of doses by a factor of 2.5 is again not justified.

The reviewer has selected normalization weight factors from ICRP-26 to further reduce the organ doses. For example, the dose to the pulmonary region is multiplied by 0.06, i.e. a reduction factor of 16.7.

The dose reduction process is not a correct interpretation of ICRP-26. BEIR (1980) does not suggest the reviewer's procedure. Thus, the reviewer has reduced doses from selected pathways by $2.5 \times 16.7 = 42$ times. This factor in conjunction with assigning a zero dose to selected pathways and organs may result in an underestimation of the doses by a factor of up to 100 for selected organs.

Attachment C of Dr. Hamilton's review indicates that the annual organ dose commitments were obtained from Tables 3.10, 3.11 and 3.12 of ANL/ES-131. Since these tables only identified selected exposed organs, the reviewer assumed that the dose for those organs which were not identified (blank) were zero. For example, external doses from ground deposited and airborne radionuclides to pulmonary, nasopharynx, bronchial epithelium, bone, kidney and liver were equated to zero. This was neither implied nor indicated in ANL/ES-131. Similarly, annual dose commitments from the ingestion pathway were not calculated for all organs.

Therefore, the sum of the annual organ dose commitments given in Attachment C of Hamilton's review are underestimated.

After correction for the underestimation of the doses and incorrect dose reduction, assuming an error in dose assignment of 50 times (upper risk) and 100 times (lower risk), the estimated risk from Dr. Hamilton would be the same order of magnitude as those from ANL/ES-131.

For example, for the Absolute Risk Model ANL/ES-131 Upper Risk is 2.38 cases divided by 10,000 (i.e. 50×200 where 50 is the underestimation factor) resulting in 2.38×10^{-4} cases/rem.

Similarly following Dr. Hamilton's procedure for the ANL/ES-131 Lower Risk, 2.38 cases divided by 20,000 (i.e. 100×200) where 100 is the other bound of the underestimation factor) results in 1.2×10^{-4} cases/rem.

The risk factor reported by ICRP-26 is: 1.6×10^{-4} death/rem.

BEIR (1980) Table V-30 (excluding leukemia and bone) indicates:

$$\frac{(2312 \text{ cases} \times 10^{-6})}{10 \text{ rad}} = 2.3 \times 10^{-4} \text{ death/rem for male}$$

$$\frac{(5356 \times 10^{-6})}{10 \text{ rad}} = 5.4 \times 10^{-4} \text{ death/rem-person for female}$$

Dose equivalent (rem) is numerically equal to (rad) for low-LET radiation. The average for male and female = 3.9×10^{-4} death/rem (excluding leukemia and bone)

For leukemia and bone, Table V-16 of BEIR (1980) indicates:

$$\text{Male: } \frac{274 \times 10^{-6}}{10 \text{ rad}} = 0.3 \times 10^{-4} \text{ cases/rem}$$

$$\text{Female: } \frac{186 \times 10^{-6}}{10 \text{ rad}} = 0.2 \times 10^{-4} \text{ cases/rem}$$

Average for male and female = 0.2×10^{-4} cases/rem.

Thus, from BEIR (1980), the total risk from all causes $3.9 \times 10^{-4} + 0.2 \times 10^{-4} = 4.1 \times 10^{-4}$ cases/rem.

The estimated risk of 1.2×10^{-4} (lower) to 2.4×10^{-4} cases/rem (upper) predicted from ANL/ES-131 analyses are about the same order of magnitude as those from ICRP-26 and BEIR (1980) and the projected risks in ANL/ES-131 based on incidences are reasonable.

The risks calculated for the ANL/ES-131 report were assumed to be uncertain by a factor of at least 5 for dosimetry and at least 5 for risk coefficient, or at least 7 times for the calculated risks. BEIR (1980) aptly indicates:

"It is not yet possible to estimate precisely the risk of cancer induction by low-dose radiation, because the degree of risk is so low that it cannot be observed directly and there is great uncertainty as to the dose-response function most appropriate for extrapolating in the low-dose region."

The above uncertainty is compounded by a large uncertainty in dose assignment. The uncertainty in doses arise from calculated source terms, concentrations, size distributions, and input for the metabolic models and exposure conditions.

In the cases of high uncertainty and a matter of life, the ALARA principle (the principle of as-low-as-reasonably achievable) dictates a reasonable attempt to contain the radioactive waste from contaminating the biosphere.

10-40 See response to comment 10-38.

10-41 See response to comment 10-39.

10-42 Seventy-year dose commitment is defined as: time-integrated dose of radiation from a body burden acquired in a single intake; the period of integrations is 70 years after the intake.

Annual 70-year dose commitment is defined as: time-integrated dose of radiation from a body burden acquired during a single year; the period of integration is 70 years after the intake.

For an external exposure, the annual 70-year dose commitment is equal to the time-integrated dose during the exposure year or annual exposure rate. Thus, the reported doses in Table 3.12 of ANL/ES-131 are annual dose rates (mrem/yr) at the specified organs.

Table 3.12 of ANL/ES-131 provides specific organ doses from airborne and ground deposited radionuclides. It also provides an average whole body external dose from airborne and ground deposited radionuclides. Individual organ doses are calculated on the basis of the organ's location within the body and tissue attenuation of each gamma energy. The average whole body dose is an average of all organ doses.

In the absence of an organ dose, an average whole body dose may be substituted. The whole body dose may be higher or lower than an individual organ dose depending on the depth of the organ within the human body and the energy of the radiation.

10-43 External doses from radium from either airborne or ground deposited radionuclides also contains doses from release of Bi-214, Pb-214 and ingrowth of daughters. The default value for the whole body dose conversion factor from Bi-214 is 1.85×10^{-4} (i.e. 195 times greater than that from Ra-226). The reported external dose (Table D.13 of ANL/ES-131) also includes an effect of radiation shielding for partial indoor occupancy.

10-44 Reviewer is correct. See the amended Chapter 3 of ANL/ES-131. The coordinates were erroneously introduced as +3, +1 in place of -3, +1. The effect of this error on the projected concentrations, doses and risks are insignificant (See Figure 3.6 of ANL/ES-131). At a distance of 3 km in an easternly or westernly direction, the airborne and ground deposited concentrations are equal.

10-45 The default removal half-life value for UDAD seriously underestimates disappearance of radionuclides from soil surface for the Jackpile-Paguate mine area. The removal half-life is conditioned by both

geophysical and climatic (i.e. rain and snow) conditions. UDAD does not calculate the contribution of windblown materials (surface creep) onto the adjacent environment. This omission results in an underestimation of ground contamination (Momeni et al in EPA report 520/3-79, -002, 1979).

Thus, in absence of site specific data for the area, the authors suggested that the value of 10,000 years may be more representative of environmental conditions at the Jackpile-Paguate mine.

- 10-46 Radon daughters attach themselves to the surface of dust particles. Page 15 of the UDAD Manual (NUREG/CR--0553) indicates that for lead-210 and polonium -210 produced from radon in transit, a settling velocity of 0.003 m/sec is assumed.

Page 19 of the UDAD Manual also indicates that for short-lived radon daughters (Po-218, Pb-214, Bi-214), a settling velocity of 0.003 m/sec is assumed.

Page 64 of the UDAD Manual indicates that the radiation dose from inhalation of radon and its daughters is calculated from:

Dose rate = indoor dose rate + outdoor dose rate

Indoor dose rate = $0.625 \times f_I \times \text{concentration of radon}$ where:

0.625 = the conversion factor in mrem per pCi/m³ of radon

f_I = the frequency of indoor occupancy

Outdoor dose rate = $1.25 \times 10^5 (1 - f_I) \times (WL)_0$ where:

1.25×10^5 = the conversion factor in mrem/WL

$(WL)_0$ = the outdoor working level.

Thus, for dosimetry of radon and its daughters the two methods are combined.

- 10-47 The external dose calculated by SENES is underestimated by omission of the radionuclide buildup and contribution of Bi-214 and Pb-214 emissions. Also see response to comment 10-43.

The analyses incorporated in ANL/ES-131 were based on site-specific data, whenever the data were available, and an average value for each of the parameters whenever the site specific data was not available.

The ANL/ES-131 dosimetry is a reasonable estimation of doses. However, Dr. Momeni et al reported an uncertainty of at least a factor of 5 of the calculated doses (See page 16, Section 4 of ANL/ES-131).

- 10-48 See responses to comments 10-30 to 10-41.

The risk estimates calculated from the relative risk model were adjusted as follows:

- 1) deletion of risk estimates for leukemia and bone cancers;
- 2) adjustment of risks for cause CA-8 (kidney, urinary system and sex organs) from 134 to 1.4. The error was due to erroneous use of a percent spontaneous incidence coefficient; and
- 3) revised estimates based on adjustment of incidence to mortalities

10-49 The 1985 Multiple Land Use Plan is fully evaluated in the FEIS.

10-50 Dr. Hersloff's method for determination of the mineralized area is described on pages 1 and 2 of her report as:

"...based on personal inspection of the pits as well as contour maps and an aerial photograph provided by Anaconda Minerals Company. Since the Jackpile Sandstone has a distinctive white appearance, it is easily recognized by personal inspection and on the aerial photographs."

The technique for estimation of the contaminated areas (areas containing a Ra-226 concentration in excess of 5pCi/g) is not indicated in her report.

The method used in ANL/ES-131 for determination of the areas defined as radioactive (i.e. containing a Ra-226 concentration in excess of 5 pCi/g of soil) was based on the following data:

1. Radioactivity concentration in composite samples from each mine area as measured by Anaconda (see Table 3.1 and Figure 2.24 in ANL/ES-131 and Table 2-13 in the FEIS).
2. "Reclamation Plan, Jackpile-Paguate Mine" Anaconda Minerals Company 1980.
3. "Reclamation Plan, Jackpile-Paguate Uranium Mine" Anaconda Minerals Company 1982.

A part of this data is reported in ANL/ES-131(pages 2-37 through 2-39, pages 3-6 through 3-8 and Figure 3.4).

10-51 The ANL/ES-131 report, pages 3-6 through 3-8 and Figure 2.24, provide a breakdown for each of the disturbed areas and the corresponding Ra-226 concentrations. The activity concentrations were provided by Anaconda Minerals Company (see response to comment 10-50). They were obtained by measuring the activity in composite samples from each disturbed area. Dr. Momeni did not make any assumptions, except that the data submitted by Anaconda Minerals Company was representative and accurate. Dr. Hersloff does not report the concentration of radium in each area. The statement that her release rate is 57 percent of those in the ANL/ES-131 is only a reflection of the differences in her estimation of the mine areas.

10-52 See response to comment 10-50.

10-53 We have reviewed our volumetric calculations and the material provided by Anaconda. This information will be further refined before reclamation begins.

10-54 To move the material that Anaconda stated they would move under the Green Book plan would raise the level of backfill substantially above the backfill levels which Anaconda predicted. The backfill elevations would be: 41 feet higher in Jackpile pit; 3 to 17 feet higher in North Paguate pit; and 23 to 77 feet higher in South Paguate pit. This "excess" backfill is a result of waste dump slope modifications

The additional backfill needed per foot of rise at the bottom of the pits ($350,000 \text{ yds}^3/\text{ft}$) is correct. However, near the projected backfill elevations, the quantity needed per foot of rise increases to $500,000 \text{ yds}^3/\text{ft}$. The additional material needed to backfill each pit to the levels listed above is $18,400,000 \text{ yds}^3$; DOI calculated that this material would come from the waste dump slope modifications proposed in the Green Book plan.

At the time the DEIS was issued, the final design for the drainage option was not completed. The estimate of the preliminary design showed 700,000 cubic yards of rock in place to be moved (973,000 loose cubic yards). The final design has been completed and is included in the FEIS. This design shows that with the increased backfill elevations, North Paguate and South Paguate pits are self-draining. To make the Jackpile pit drain, 22,000 cubic yards of in-place rock must be moved (33,000 loose cubic yards).

The EIS does not indicate that dump slope reduction is essentially eliminated. The document showed that the material which has to be moved for waste dump slope reduction almost fills the backfill needs for the Laguna proposal. In generating cost estimates, DOI chose to move the minimum amount of material which needed to be moved even if it was moved for a longer distance. This kept the cubic yards hauled and related costs down.

The difference in protore volume between DOI and Anaconda have been accounted for and agreement on volumes reached (Table 2-4 has been revised in the FEIS).

10-55 DOI based its material movement on the equipment requirements and production rates in the Caterpillar Performance Handbook, Edition 15, and a computer model being developed by Caterpillar. Haul routes were plotted on maps provided by Anaconda (T.R. Mann 1981, 1"=400'). Haul lengths and slopes were calculated. We believe the costs are accurate enough for purposes of this analysis.

10-56 We regret the difficulties the reviewer encountered in attempting to convert our data base to his program.

10-57 See response to comment 10-56.

10-58 See response to comment 10-56.

10-59 It is true that the DOI also experienced a significant number of data errors, but these were sought out and corrected before final volumetric computations were performed. Largely these errors were introduced into the data during format conversions but subsequent to the actual digitizing process. It is possible that some data provided to Anaconda by Technicolor Government Services may have been the uncorrected data files which had not been purged from their archives. It should be pointed out that many of the problems DOI encountered were due to the fact that the software utilized was not ideally suited for handling data of the very large scale as was handled in this program. Generally, the errors introduced during data handling and format conversion were introduced during scaling and/or were due to improper round-off. Such problems were corrected by modification of the software and/or by recreation of the data files. It must also be noted that Anaconda attempted to use data in a different format (vector) than used by the DOI (cell). The Anaconda data were generated using the function EXPORT in order to provide a data format compatible with their software. This function was not applied to the DOI data.

DOI Summary Response to Morrison-Knudsen and Kelsey:

-We believe that the DOI computations provided reasonably accurate volumes and costs, certainly sufficient for purposes of impact analysis and comparison of alternatives for the decisions to be made from this document.

-The various proposed reclamation plans contained many complex variables, each subject to a wide range of interpretations (e.g. where to place the cut/fill template on an existing slope). It is in the interpretation of these variables that the DOI and Morrison-Knudsen differ; the result is a wide range of volume estimates. A case-by-case examination and comparison of individual reclamation areas would be necessary to determine the source, consequence and/or validity of these differences.

-The DOI assembled an extensive set of volumetric data using carefully researched digital processing techniques. Several computational techniques were considered. The technique selected was considered the most appropriate for the highly dissected and convoluted pits and piles which characterized the Jackpile-Paguete uranium mine.

-The computational technique utilized by the DOI was tested at the outset using a pilot study, and an estimate of expected errors was made. These errors were well within 5 percent. Throughout data processing and analysis, quality control checks were utilized and, when necessary, corrections were made.

-DOI conscientiously responded to all requests for volumetric information and cost data. The large quantity of computed volumetric information has been catalogued and retained and is available on request.

10-60 See response to comment 10-14.

10-61 The contention that the modified Janbu and modified Bishop methods (basis for the computer program STABL) or other methods represent a more sophisticated analysis than Morgenstern-Price is incorrect. The STABL is more sophisticated because it can generate a large number of pseudo-random trial failure surfaces automatically, instead of having to input a series of coordinates for each trial surface. The methods used to evaluate the safety factor for each surface (Modified Bishop, Janbu, or Fellenius) are not as sophisticated as the Morgenstern-Price method because they ignore inter-slice equilibrium conditions. As a practical matter, the difference in safety factors for the same failure surface computed by the two methods is generally insignificant. We have no argument with the results of the STABL program, only with the input data.

10-62 The DOI proposal for modifying the profile of Gavilan Mesa was a conceptual design based on the DOI's concern over the stabilization of the highwall. CEQ requires that an EIS evaluate all reasonable alternatives and mitigating measures. We share your concerns.

10-63 DOI used its own safety factors for analyzing the stability of highwalls at the Jackpile-Paguate minesite. The safety factors calculated by Seegmiller were shown in Chapter 2 of the DEIS for comparison only.

10-64 The results of the stability analyses seem to indicate that the higher reservoir level results in a greater safety factor than a lower reservoir level, and in one case, that the presence of the proposed reservoir increases the safety factor over dry conditions. The differences in the computed safety factors are not large but they are consistent. The reviewer explains this apparent paradox by proposing a toe buttressing effect of the water. The explanation is erroneous. The explanation of this apparent paradox lies in the use of a cohesion component of the shear strength. The safety factor of a slope in cohesionless material is the same whether the slope is dry or submerged. This is because the reduced frictional resistance caused by the increased pore pressure is exactly compensated by a reduction in the driving forces caused by the buoyancy effect. If cohesion is assumed to be present, this component of resistance is not reduced by the increased pore pressure and therefore, a slightly higher safety factor results. We are aware that certain calculations may indicate slightly increased stability under water storage condition, especially if cohesion is assumed to be present. However, it must be emphasized that such an analysis assumes a static water table and no seepage forces. The fact that water is actively flowing into the ponds indicates that seepage forces do exist and any such forces will lower the safety factor.

- 10-65 For long-term stability analysis, it is standard engineering practice to assume cohesion is equal to zero. The reviewer's analogy to freeway fills is totally inappropriate. Such fills are constructed of selected materials and are compacted near the optimum moisture content. The purpose of letting the fill stand for a period of time is to allow dissipation of excess pore pressure. The "cohesion" referred to in the case of a fill is the undrained shear strength. It is a different concept than cohesion in the Mohr-Coulomb failure criterion, and applies only to saturated soils, a condition not representative of the waste dumps at the Jackpile mine. The analysis of undrained shear strength is also referred to a $c = 0$ analysis, that is, there is no strength contribution from friction.

For long-term stability, slopes should be designed on the basis of residual strength, and residual cohesion is generally assumed to be zero for both soil and rock.

- 10-66 The large tension cracks at the crest of FD-2 dump and cracks near the toe indicating possible foundation spreading suggested that the dump was in a state of incipient failure. Without knowing the initial condition of the dump and without making repeated measurements, it is impossible to know how much rotational movement or settlement had already taken place. Part of this argument is semantic, that is, what constitutes "failure". Movement of even several feet may not constitute failure in a practical sense.

The reviewer claims that FD-2 dump should now be stable but offers no evidence to support the conclusion. Movement of several feet does not generally result in an increase in stability of soil masses of this size. The reviewer dismisses the possibility of excessive water infiltration or earthquakes triggering further movement. Water infiltration through the tension cracks at the crest is very likely, especially during intense summer thunderstorms and periods of snowmelt. In 1972 and 1973, three earthquakes occurred within 25 miles of the mine. One of these had a Richter magnitude of 4.4 and a Modified Mercalli intensity of VI.

- 10-67 See response to comment 10-27.

- 10-68 We agree that all reclaimed areas should be adequately stabilized before livestock are allowed to graze in the minesite. However, carrying capacities for domestic livestock should not be used as a criterion for reclamation success. The revegetation success criteria as proposed by DOI, in conjunction with waste pile sloping and specific cover placement techniques, would ensure stabilization of radioactive materials. This criterion is considered as being primary and livestock grazing capacity in the area as secondary.

- 10-69 The CSA is a proven method for monitoring and evaluating plant communities developing on reclaimed areas. This method has been successfully used by BLM and Forest Service on grazed and ungrazed sites. The CSA method employs a wide range of parameters to judge the effectiveness of reclamation measures.

- 10-70 DOI acknowledges that the Dames and Moore (1983) did not report any specific statement that the pit bottoms would become unproductive salt playas. In their sensitivity to backfill permeability and infiltration analyses, Dames and Moore discusses various degrees of infiltration and evaporation of ponded water, but do not mention salt accumulation (p. 20-23). Salt storage concerns were raised by DOI hydrologists. They concluded that "the ponds have a salt storage rate ranging from 3.1 to 7.5 tons per surface acre per year. The rate was based upon chemical analyses of pond water from December 1982 to March 1984. The DOI hydrologists further concluded that TDS concentrations in closed pit bottoms would exceed 10,000 mg/l in 2, 8 and 30 years for the Jackpile, North Paguate and South Paguate pits, respectively.

The reference made to groundwater flow through the backfilled pits apparently contradicts the Dames and Moore report that Dr. Keammerer cites. Flow rates of 1.5, 11 and 20 gpm for seepage migration through Jackpile, North Paguate and South Paguate pits, respectively, hardly seems "considerable" (p. 33, Dames and Moore, 1983). It is arguable, using Dr. Keammerer's figures, that 9 percent of some total volume can be described as "considerable". The final statement of the comment paragraph seems to confuse groundwater flow in the backfill with flushing by groundwater flow of salt accumulated from evaporated surface runoff at the pit surfaces. Should the groundwater surface be exposed to the atmosphere, it will then be contributing to salt accumulation by evaporation, not flushing the salts by slow seepage rates.

Alternating raised and lowered water tables, surface evaporation, capillary action, and underground water transport by plant root systems will contrive to gradually build up surface salt concentrations to levels uninhabitable by most plant species. Such an accumulation is a reasonable expectation which might be hastened by the introduction of phreatophytes. Therefore, the proposal to minimize backfill by using phreatophytes to dissipate groundwater accumulations generates concerns that water transport by plants would: 1) concentrate radium in plant tissue, 2) concentrate salts and toxic materials in the upper soil profile, and 3) possibly provide a mechanism for releasing radon gas to the atmosphere from root systems penetrating layers of low grade uranium. This strategy may increase health hazards and ultimately diminish the ability of the sites to sustain productive or useful plant communities.

- 11-1 We suggest that the Department of Health and Human Services pursue these recommendations with the Pueblo of Laguna. These issues are separate from the reclamation proposals being addressed in this document.
- 13-1 The EIS team shares the concern that inadequate backfill of existing pits combined with fluctuating water tables will create a state in which capillary action in upper unsaturated soil profiles will concentrate salts, heavy metals or toxic substances. The preferred alternative provides for supplementary backfill to alleviate this problem.

- 13-2 The vent holes were up-reamed to 48 inches then lined with 42 inch steel casing. Whichever proposal is approved, radon gas would accumulate in the vent holes but there would be no avenue of escape through the casing or the plug (whichever plugging method is used). Under the Preferred Alternative, the vent holes would be backfilled to the level of the plugs. Oxygen to the groundwater would be denied and the groundwater should return to its natural reduced state.
- 13-3 As suggested, the definition of hydraulic conductivity has been revised in the FEIS.
- 14-1 As stated on p. 1-36 of the DEIS, all reclamation and environmental components would meet the required goals and criteria immediately following reclamation. However, it is not possible they would do so indefinitely. Because of the close proximity of Paguate Village to the minesite and the presence of two small perennial rivers (Rios Moquino and Paguate), it is obvious that some form of long-term monitoring or custodial control and remedial action would be necessary to ensure that reclamation is not undone by natural forces.

On page 3-28 of the DEIS, DOI explained the rational for using the Dames and Moore report and modeling analysis which was commissioned by Anaconda Minerals Company. As stated by USGS-WRD in comment 13, "...the inherent limitations of any groundwater model suggest that adequate allowance for degree of accuracy should be made in the application of results to specific situations." Therefore, rather than trying to find a perfect model, the DOI developed mitigating measures for its proposals which do not depend on accurate predictions.

- 14-2 Health studies of Native Americans are the responsibility of the Department of Health and Human Services. See comment letter 11.
- 14-3 See response to comment 9-7.
- 14-4 Paguate Reservoir is well past the 20-25 year design life stipulated by its builders. The reservoir would have been filled with or without the Jackpile mine by the mid-1960's. The purpose of the reclamation effort cannot be extended to correct the natural siltation of the reservoir. The possible radiological contamination in Paguate Reservoir is considered to be an unresolved liability issue. To date, the levels of radiation found in Paguate Reservoir are above background levels but, except for a few cases, do not exceed generally accepted limits.
- 14-5 The reclamation is recognized as a potential employment opportunity, the duration of which is dependent on the level of intensity and methods selected (workforce and equipment). Obviously it could be strung out for many years but we feel that in the interests of alleviating the public health and safety problems identified at the site it should be accomplished as expeditiously as possible.

- 15-1 The socioeconomic impacts of the mine closing are not within the scope of this EIS. However, the existing socioeconomic status of the Pueblo of Laguna is recognized in the description of the Affected Environment and under the No-Action Alternative. The socioeconomic impacts in regard to reclamation employment, are addressed on page 3-47 in the EIS as man years of labor.
- 15-2 Due to the highly variable hydraulic character of the backfill (page 2-55, DEIS), projection of groundwater recovery levels is speculative. Accordingly, DOI adopted the results of a model that had peer review by USGS hydrologists and was found to be computationally sound. The EIS includes alternatives to accomodate unknown future conditions.
- Also see response to comment 14-1.
- 15-3 The existence of four shrines within the lease areas is noted on page 2-78 of the DEIS. It is the understanding of the DOI that all shrines are located within areas not previously disturbed by mining. Therefore, direct impacts upon these sites are not expected to result from reclamation activities. Upon completion of reclamation, Pueblo members will enjoy an ability to conduct religious activities in surroundings more closely approaching natural conditions free from the hazards imposed by the existing mine workings.
- 15-4 The radiological analysis of Chapter 3 has been revised and reflects DOI's best estimates of potential radiological health effects under the various reclamation alternatives.
- 15-5 See response to comment 14-1.
- 15-6 The five-year monitoring period described in the DEIS is a minimum. Table 1-3, page 1-19 of the DEIS discusses a monitoring plan with more scope than five years. In addition, the preferred alternative identified in the FEIS minimizes sheet wash and rill erosion, and the impacts of flooding on waste dumps, while maximizing waste pile slope stability. As pointed out in DOI's response to comment 14-1, the complex nature of the minesite and the interrelationships of various environmental components would necessitate some form of long-term monitoring.
- 15-7 The reclamation procedures identified under the preferred alternative would minimize surface runoff and provide water for plant growth. Except for unusual storm events, site runoff would be minimal. Therefore, any ponding and subsequent salt build-up resulting from normal seasonal precipitation would be negligible.
- 15-8 As stated in the FEIS, determining if damages occurred from blasting during mining operations constitutes an unresolved liability issue.
- 15-9 The location of monitoring wells is indicated on Visual A of the EIS.

- 15-10 Because of the complexities and technical data associated with groundwater modeling, the EIS only summarizes the results of the modeling. Details of the models and calibration procedures are given in the references cited. References are available for public review at the BLM Albuquerque District, Rio Puerco Resource Area Office.
- 15-11 The projected post-reclamation potentiometric surface maps for each alternative are available for review at the BLM Albuquerque District, Rio Puerco Resource Area.
- 15-12 See response to comment 15-7.
- 15-13 See the reference section of the FEIS: USGS, WRD (Zehner, 1985). The document is available for public review at the BLM Albuquerque District, Rio Puerco Resource Area Office.
- 15-14 The location of surface water sampling sites is indicated on Visual A of the EIS.
- 15-15 The internal cut-off, as proposed under the Green Book Plan, is summarized on page 3-25 of the FEIS. Additional details on the proposed dam is contained in Dames and Moore (1983). This reference is available for public review at the BLM Albuquerque District, Rio Puerco Resource Area Office.
- 15-16 DOI recognizes that each hydrologic model will exhibit differences from other models. Existing knowledge does not permit pin-point descriptions of the post-reclamation hydrologic regime. This is the reason DOI proposed the monitor and drainage options.
- 15-17 See responses to comments 10-10 and 10-28.
- 15-18 See response to comment 10-54.
- 15-19 We believe DOI's calculations are accurate enough for purposes of this analysis and decisions to be made.
- 15-20 See response to comment 15-19.
- 15-21 For the health risk analysis in Chapter 3 of the EIS, the size and composition of the regional population were assumed to change continuously with time. Population projections were calculated using the cohort-component method. The PRIM code is a cause-specific risk model applying the life-table method to each population age-cohort at each time. See Table 4.9 of ANL/ES-131.
- 15-22 The radiological assessment in Chapter 3 provides a realistic estimate of the impacts which could occur under each reclamation alternative.
- 15-23 Low risk of subsidence does not necessarily mean no subsidence. In the case of the P10/7 mine (1500 stope), it means that the subsidence rate will be slow and the risks of a subsidence hazard is low.

15-24 The FEIS has been revised to address these concerns.

15-25 The FEIS has been revised to address these concerns.

15-26 The FEIS identifies in general terms the reclamation necessary but not the details to accomplish the work, which is variable. The level of treatment is believed to be sufficient for purposes of this analysis.

15-27 See response to comment 9-7.

15-28 Post-reclamation land uses under each alternative are listed in Table 1-3 of the EIS. Other items in this comment are secondary in the overall context of the mine reclamation project. The questions raised would require a great deal of effort to answer and be of little value in the overall decision-making process.

15-29 Three reference sites were initially set up by Anaconda on undisturbed areas within the minesite for reclamation evaluation purposes. New reference areas will be selected when reclamation efforts are resumed. Reference sites will be established by a team of vegetative specialists in areas undisturbed by mining that are topographically comparable to the reclaimed land forms (i.e. undisturbed slopes to reclaimed dump slopes, mesa tops to reclaimed dump tops, etc.).

15-30 Page 2-72 of the DEIS provided background information on sampling procedures and plant growth monitoring techniques used by Anaconda in previous reclamation efforts. DOI does not necessarily endorse these methods; the information was presented to orient the reader with the concepts used in revegetating mined lands.

As stated in the response to comment 15-29, new reference sites will be established as part of the reclamation program. The preferred alternative in the FEIS also specifies the methodology, criteria, and monitoring duration in order to evaluate plant reestablishment at the Jackpile-Paguate minesite.

15-31 As mentioned on page 2-75 of the DEIS, dumps S and J (reclaimed in 1976 and 1977), exceeded basal plant cover values of the reference areas; therefore, monitoring studies were dropped. Dumps F,G,J,O,P,P1 and P2 (seeded in 1977) have basal cover values near 90 percent of the reference area cover values. In comparison to the reference areas, dump sites I,T,X, and Y2 (seeded in 1979) had near 70 percent basal cover after 3 growing seasons.

The Preferred Alternative in the FEIS recommends a minimum of 10 years to monitor revegetative success. Unsuccessful revegetation trials may warrant remedial action which would extend the monitoring period.

15-32 Vegetation studies were dropped in 1983 and will resume when reclamation work is initiated. Thus, the vegetative data presented in the EIS is the most current available.

- 15-33 Page 2-75 of the DEIS stated that almost no vegetation had been established on dump slopes. The statement regarding reclamation trials on page 3-40 has been clarified in the FEIS.
- 15-34 The word "approximate" has been removed from the text so as not to misinterpret Anaconda's proposal to achieve a 70 percent comparability value.
- 15-35 Based on the regulations contained in 43 CFR 3570, 25 CFR 216 and the lease terms, Anaconda was ordered to fence, sign and provide on-site security in a letter dated April 4, 1986. This action was taken outside of the EIS process under the operating regulations cited.
- 15-36 This comment anticipates a large reclamation workforce. Large is a relative term but to try to put some dimension to it, it is expected that the reclamation work force, assuming a 3-year program, would be approximately 70 jobs or approximately 10 to 15 percent of the maximum employment during mining. This would not create a boom but only relieve some of the present unemployment if local people were hired. If non-local people were hired it is not anticipated that they would be looking to buy housing in the area for a three year job. Some of the workers may look for rental housing, some may bring in mobile homes, while others may commute from as far away as Albuquerque. The transportation network that handled the mining work force certainly would be adequate to handle the reclamation workforce. This should be true of most other community facilities.
- 15-37 A complete sociological baseline report and impact analysis was prepared by the Council of Energy Resource Tribes in 1983. The information in these documents is summarized in the EIS.
- 15-38 According to Anaconda, the reclamation project could be contracted out to the lowest bidder and no hiring restrictions or requirements be placed on the contractor.
- 15-39 See response to comment 14-5.
- 15-40 The FEIS contains an analysis of health impacts to workers involved in reclamation. The analysis indicated that such impacts would be negligible. Therefore, the impacts to the health and welfare of people living offsite would also be negligible. Also see response to comment 14-5.
- 15-41 These comments are identical to Comment 14. See corresponding responses.
- 15-42 See response to comment 10-1.
- 15-43 The sentence as quoted has been deleted from the EIS. The scope of the document is as follows:

"The scope of the EIS is 1) the reclamation (restoration to productive use) of the Jackpile-Paguate uranium mine and the affected adjacent areas, and 2) mitigation of impacts resulting from reclamation."

To some degree, post-mining impacts are recognized in the description of the Affected Environment (Chapter 2) and evaluation of the No Action Alternative.

15-44 See responses to comments 14-2, 14-4, and 15-8.

17-1 The Bureau of Land Management Denver Service Center compiled a pre-mining topographic map from aerial photos taken in 1951 of the Jackpile-Paguate minesite. This map is available for public review at the BLM Albuquerque District, Rio Puerco Resource Area Office.

17-2 Anaconda provided DOI with drill hole location maps but was not required to quantify the surface disturbance associated with each hole. Approximately 20,000 development and exploration holes were drilled on the Jackpile-Paguate mining leases. The majority of the holes were drilled in areas which are now pits and were removed by mining excavation or covered by dumps. To date, approximately 2,300 drill holes have been plugged and plugging of drill holes would continue under the various reclamation alternatives. The remaining unplugged drill holes could pose a hazard to livestock until reclamation work is initiated.

17-3 See responses to comments 14-2 and 15-44.

17-4 Throughout the entire EIS process DOI has diligently coordinated and consulted with the Pueblo of Laguna on highly sensitive issues related to the Jackpile reclamation project. This input combined with technical data compiled by DOI and other contributors has served as the basis in determining the appropriate level of reclamation to be performed at the Jackpile minesite. DOI feels that it has fulfilled its trust responsibility to the Pueblo of Laguna throughout the EIS process and will continue to do so in the future.

17-5 DOI is responsible for analyzing the potential impacts of reclaiming the minesite. The responsibility for studying the health of local residents and providing for long-term health care rests with the Department of Health and Human Services. See response to letter 11.

17-6 As stated in item 3, page 1-5 of the DEIS "the mining lease terms and Federal regulations (25 CFR Parts 211 and 216, and 43 CFR Part 3570) require that reclamation be performed by the leaseholder."

17-7 The scope of the EIS was determined through the public participation process and by studying various technical issues associated with the mine reclamation project. DOI's criteria for determining which issues were to be addressed in the document was explained on page 1-7 of the DEIS.

- 17-8 DOI required lessees to reclaim two other uranium mines on Indian lands within New Mexico. Although the largest of these mines was 35 acres, the technical problems and reclamation standards and methodologies were similar to the Jackpile-Paguate minesite.
- 17-9 The likelihood of sink holes occurring within the backfilled pits is very remote. Additionally, no human habitation should be allowed in the entire minesite.
- 17-10 See response to comment 17-5. Also, Chapter 3 of the FEIS analyses both the impacts to workers involved in reclamation and the post-reclamation impacts to the general population for each alternative.
- 17-11 As listed in Table 2-6 of the EIS there are 22 vent holes remaining at the minesite.
- 17-12 Refer to Table 2-13 in the EIS for the radiological content in the partially backfilled pits.
- 17-13 The principal features of interest listed in Table 2-1 of the EIS are intended to orient the reader with the geographic and demographic setting of the Jackpile mine. The listing was not intended to be all inclusive.
- 17-14 For purposes of impact analysis, selected portions of Anaconda's monitoring data were used throughout the EIS. All environmental monitoring data compiled to date may be reviewed at the BLM Albuquerque District, Rio Puerco Resource Area Office.
- 17-15 The location of the underground openings are listed in Table 2-6 and shown on Visual A of the EIS.
- 17-16 Radioactivity does not evaporate with water; therefore, there is no possibility of "radioactive rain" in this context.
- 17-17 Lack of information on environmental conditions 30 years ago is not unique to this project. Only since the mid-70's has detailed environmental data been routinely collected by government and industry.
- 17-18 The sites were determined to be insignificant under provisions of 36 CFR 800 by the BIA and the New Mexico State Historic Preservation Office in consultation with the Pueblo of Laguna. It should be noted that insignificant sites included such items as the Woodrow Mine workings and modern trash disposal areas. As is noted on page 2-77 of the DEIS, a complete cultural resources inventory has been conducted for the lease areas. Results of the inventories are available at the BIA Albuquerque Area Office for inspection, although locational information is held as confidential under provisions of the Archeological Resources Protection Act.

- 17-19 Table 2-36 of the EIS lists chemical and radiological analysis of plants sampled on a one time basis (see DATE TAKEN column). Additional sampling would be required to determine actual increases and/or decreases in chemical uptake.
- 17-20 Studies of the effect of blasting on occupied dwellings in the vicinity of quarries, mines, construction sites, etc. indicate that regulating the size of blasts and the timing of blasting can keep the particle velocity under 2 in/sec. This would preclude damage from occurring to man-made structures.
- 17-21 As stated in the previous response, it has been shown that, with proper controls, blast damage would be precluded. Such controls would also preclude damage to the underlying geologic strata and hydrologic systems. The DOI is not aware of any existing ground instability affecting the houses in the Village of Pagate; however, if any blasting is done, the controls used to prevent damage to houses would also prevent worsening of any instability.
- 17-22 See responses to comments 14-2 and 17-5.
- 18-1 We appreciate your views.
- 20-1 Some of the documents in this letter are comments on the DEIS while others are support documentation for the 1985 Multiple Land Use Reclamation Plan. Items 1, 2, 3, 7 & 8 are comments on the DEIS and are basically the same content as Anacondas' preliminary comments (Commented Letter No. 10) submitted to DOI on 8/19/85. In order to reduce paperwork and avoid duplication, the comments and support documentation referenced in Comment Letter No. 20 have not been reproduced in this section. They are available for review at the BLM Albuquerque District, Rio Puerco Resource Area Office, Albuquerque, New Mexico.
- 22-1 Analyzing the protore piles and waste dumps for particular constituents would not necessarily mean it would be possible to quantify the concentration of those constituents in any surface or groundwater system. Table 2-13 of the FEIS does list the uranium concentration in the protore piles, waste dumps and pit areas; however, this information was used mainly for the radiological health assessment.
- 22-2 The seed mixtures in Tables 3-10 and 3-11 of the EIS, combined with the natural invasion of other species that occupy adjacent undisturbed areas, would provide an adequate level of diversity to enhance wildlife utilization at the Jackpile-Pagate minesite.
- 22-3 Quantification of groundwater changes is difficult to assess. The analysis contained in Dames and Moore (1983) and ANL/ES-131 (1983) are only predictions of future water quality based on certain assumptions. Given all the variables involved the analysis in Chapter 3 (Groundwater Quality) is the best that can be done at this time. The EIS does contain an analysis of water samples from the Rio Pagate.
- 22-4 Containment of all solid wastes and liquids within the lease property was rejected as an alternative for the reasons cited on page 1-9 of the EIS.

The slope stabilization and cover treatments proposed under the preferred reclamation alternative would minimize the uptake of heavy metals into plant species. Monitoring data would be used to ensure that the quality of vegetative materials would be suitable for livestock and wildlife. Vegetation found to contain concentrations of heavy metals toxic to livestock would be removed and the underlying area would be subject to remedial treatment.

- 26-1 See response to comment 6-6.
- 26-2 Groundwater quality is addressed in Chapter 3 of the EIS. Item 4 of "Issues Evaluated" has been revised to include groundwater contamination.
- 26-3 Because of the complex nature of groundwater modeling it is not possible at this time to determine the amount and duration of monitoring necessary to predict the final groundwater recovery levels. After the monitoring program is implemented the information collected would better define the extent of the monitoring program.
- 26-4 Monitoring periods would vary with each reclamation component and not necessarily tied to a 10-year minimum. The preferred alternative of the FEIS specifies the monitoring periods necessary to ensure that the reclamation effort is successful.
- 26-5 The radiological analysis contained in the EIS integrates all radiological exposures including that from the food chain to estimate a total radiological dose. Details of the analysis are contained in ANL/ES-131.
- 26-6 As the commentor indicates, sealing the spring is not practical. The water would erupt elsewhere.
- 26-7 A full scale highwall monitoring program would not be cost effective, nor is it believed necessary. A simplified monitoring plan has been included as part of the Preferred Alternative in the FEIS.
- 26-8 Worker safety requirements and sanitation systems are regulated by other Federal agencies and the State of New Mexico.
- 27-1 Page 1-10 of the DEIS stated that the primary goal of reclamation is "to reclaim and stabilize the minesite to restore productive use of the land and to ensure that adverse environmental impacts are reduced to the extent possible". Additionally, page 1-10 of the DEIS listed those reclamation objectives of primary importance. Although the DOI intends to meet as many of the objectives as possible, it should be noted that the very nature of the previous mining activities make it impossible to reclaim the minesite to its pre-mining condition and to allow unrestricted use of the land and water resources within the reclaimed areas.

- 27-2 As stated in the response to comment 10-29, the DOI believes that the data, methodology and analysis presented in the EIS are accurate and fully adequate to support decisions to be made on the basis of this document.
- 27-3 The water quality data presented in the EIS is the most recent available. The different values mentioned in this comment do not significantly change the description of the affected environment. The increased radium-226 levels found in groundwater from within the minesite by Kaufmann et al. (1976) are to be expected since the aquifer has been exposed to the oxidizing environment of the air.
- 27-4 See response to comment 14-4.
- 27-5 The scoping process defined the major issues to be analyzed in the EIS. Although there could be some adverse impacts from such things as total suspended particulates in the air or minor elements in waste dumps, the degree of impacts would be minor compared to the major issues addressed in the document. Since no specific non-radiological hazards were cited by the reviewer, the DOI cannot respond in any more detail.
- 27-6 As stated in the response to comment 25-5, the radiological health assessment in Chapter 3 of the FEIS and in ANL/ES-131 considered all exposure pathways including the ingestion of water containing radioactive elements.
- 27-7 Trace metal concentrations in the Jackpile Sandstone cannot be quantitatively linked to water quality data. Also see response to comment 22-3.
- 27-8 The main emphasis in reclaiming the Jackpile mine is the containment and stabilization of the radioactive wastes. One can assume that minimizing the impacts of radioactive materials would also minimize the impacts of the non-radioactive elements of the waste material.
- 27-9 The responses to comments 10-20, 14-1 and 15-6 outline DOI's approach to the containment of radiological materials at the reclaimed minesite.
- 27-10 See responses to comments 10-10, 10-29, 17-14, 17-17 and 27-3.
- 27-11 The technical information compiled on the Jackpile-Paguate mine reclamation project is sufficient to characterize the affected environment, analyze and mitigate significant impacts and thus determine the appropriate level of reclamation to be performed at the Jackpile minesite.

With regard to the radiological standards for uranium mine reclamation see responses to comments 10-20, 14-1 and 15-6.

- 27-12 See responses to 22-3, 27-7 and 27-8. Limited trace metal analysis is contained in Dames & Moore (1983).

- 27-13 See response to comment 27-1. It should be noted that it was never the goal of any reclamation alternative to permit unrestricted use of the groundwater within the reclaimed minesite. The USGS-WRD has previously studied water resources within the Pueblo of Laguna reservation boundaries and has identified areas that have potential for providing suitable water supplies.
- 27-14 Analysis of this layering proposal has been included in Chapter 3 of the FEIS.
- 27-15 It is not possible to quantify the contribution, if any, of the Jackpile mine to the build up of uranium concentrations and sediments in the Rio Grande and Elephant Butte Reservoir. In any case, the past impacts are irreversible. Reclamation of the minesite would minimize these downstream impacts in the future, if indeed they exist at all. As stated in the response to comment 14-4, DOI has re-evaluated its position concerning sediments in Paguate Reservoir.
- 27-16 See response to comment 15-4.
- 27-17 See response to comment 10-2.
- 28-1 See response to comment 10-2.
- 28-2 See response to comment 15-4.
- 28-3 See response to comment 26-3.
- 28-4 The correction has been made in the FEIS.
- 28-5 See response to comment 26-7.
- 28-6 As stated on page 3-44 of the DEIS, this consultation has already taken place resulting in a determination that no significant cultural resources would be affected by reclamation.
- 28-7 See responses to comments 10-22, 10-23, 10-54 and 10-55.

PUBLIC HEARING TESTIMONIES

ALBUQUERQUE PUBLIC HEARING
SEPTEMBER 10, 1985

MR. RAMPTON: This hearing will come to order. My name is John Rampton. I'm an administrative law judge with the Department of the Interior, and I'm here, not as a member of the panel, but only to chair this proceeding today.

The purpose of the hearing is to receive public comment on the merits of the mine reclamation alternatives and technical accuracy of the Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine.

The members of the panel who will receive your comment are -- going to my immediate right -- Mike Pool, who is the Environmental Impact Statement team leader; Bill Allan, the area environmental protection specialist; and John Andrews, the EIS technical coordinator. I think they have some other titles, too, but that's for the purpose of this hearing.

The members of the panel here may ask questions of anyone who participates, but that's for clarification purposes only. Any of their questions which, if they do ask any, should not be indicative of any pre-determined position that they have taken, but they are here to receive your comments, and we're going to have a verbatim transcript of this hearing, and, therefore, it's imperative that only one person speak at a time, and I think it's better so we can move this along if you refrain from indicating any approval or disapproval by either applause or otherwise.

There will be an evening session here at 7:00 p.m. We're going to have a 1:00 o'clock and a 7:00 p.m. session at the community hall in Laguna, also to receive comment. Now, there have been quite a number sign up to be heard. We're asking all of those who wish to comment to limit their presentation to ten minutes and to limit their remarks to relevant matters only.

If you wish to present a prepared statement, you may do that and also make your comment on the record without that prepared statement or, even if you do; but, if you have a prepared statement in addition to what you present here orally, would you give that statement to the reporter, Ms. Haggard, here and she will mark it as an exhibit.

Now, if you're going to have a prepared statement and read it and you have an extra copy, which you don't need to make your remarks from, you can also give that to the reporter so that she can follow along. It just makes it easier and a more accurate transcript; but, if you don't, I might ask you to give the copy that you have read from to her at the conclusion of your remarks.

The comment period for this DEIS has been open since March 6th, 1985. It ends as of the close of business on October 4th, 1985, and it can be given to Mike Pool, the team leader, Bureau of Land Management, 3550 Pan American Freeway, Northeast, Post Office Box 6770, Albuquerque, New Mexico.

We'll call the participants in the order in which they have registered, and the first block of those making comment are all from the Anaconda Minerals Company. After they have concluded with their block of comment, then we will take them in the order of registration.

Now, are there any questions that you have as to what we're doing here, how we're going to do it that either I or the panel members may reply to before we hear from the first speaker? There are none. Thank you.

GOVERNOR FERNANDO: I just want to make you aware that there may be a need for an interpretation. I've noticed that we've got some of our people here that speak very little or no English at all that may wish to make some comment. I don't know that there's anyone that's registered to do so; but, if that should occur, I wish to be allowed to use my interpreter for these records so that the record will show that these comments were made.

MR. RAMPTON: You certainly may. We have one which they have indicated to me needs an interpreter. If there is anyone else, if they will just make it known to me, we'll have an interpreter here or your interpreter will be available. That's perfectly acceptable. Thank you.

Any other questions or comments? If not, we'll call our first speaker. Meade Stirland, please.

MR. STIRLAND: Good afternoon, ladies and gentlemen, Mr. Hearing Officer and panel members. My name is Meade Stirland. I am general manager of Anaconda Minerals Company, New Mexico operations. The Jackpile-Paguate Mine is part of our New Mexico operation.

To give the public some measure of perspective, I will give a brief review of some past events related to the Jackpile-Paguate Mine. The Jackpile-Paguate Mine, which is located on Pueblo of Laguna land, started in late 1951. Mining continued at the site until 12 February, 1982, when all mining activity ended. During the more than 30 years of mining activity, approximately 400 million tons of materials were moved, which included over 22 million tons of ore that was shipped to our mill near Bluewater.

Over the life of the mine, the average Laguna work force was approximately 650 people, who received wages exceeding \$85 million. In addition to wages paid by Anaconda, over \$71 million were paid to the Pueblo of Laguna as royalties, \$200,000 in lease payments and over \$2.4 million in contributions and village maintenance and upkeep. Additional unlisted millions of dollars were spent for goods and services which benefited all the local communities.

In contrast to the economic benefits to the local communities, the economics for Anaconda have not been good. Overall, the New Mexico operations have been a net loss for the company.

In 1977, Anaconda submitted a mining and reclamation plan to the Department of the Interior, in response to requirements to the applicable mining regulations and requests of the Department. In 1979, Anaconda submitted an updated version of this plan. Both of these plans were primarily mining plans which addressed reclamation in a general sense. Neither of these plans were accepted nor rejected by the department or the pueblo.

In September of 1980, we submitted a detailed reclamation plan to the Department of the Interior and the Pueblo of Laguna. This plan is referred to as the Orange Book. When we submitted this plan, the department, with the

encouragement of the pueblo, decided that an Environmental Impact Statement was necessary, and they proceeded with the process.

In July of 1981, Anaconda was informed of plans by the pueblo and the New Mexico State Highway Department to relocate State Road 279 through the middle of the mine area. As a result of the anticipated impact to our reclamation plan, Anaconda withdrew the Orange Book in August of 1981.

After resolving conditions of the rerouting of State Road 279 and reassessing our position with respect to recent changes in regulations, Anaconda made revisions to the plan, and, in March of 1982, we submitted the plan known as the Green Book Plan to the department and the pueblo. This Green Book Reclamation Plan is identified as Anaconda's plan in the Draft Environmental Impact Statement.

Over these four and one-half years since we submitted the original detailed plan, Anaconda has worked closely with the department and the pueblo to explain our plan, to understand the department and the pueblo proposals and to determine what reclamation is needed and suited for the Jackpile-Paguate Mine site. We think we have learned much during this process. We have given our reclamation plan development very high in-house priority and have employed the most competent consultants available to us at a cost of over \$3 million to date. As a result of this effort, we now believe the Green Book Plan is obsolete and represents neither the most prudent reclamation procedures for the Jackpile-Paguate Mine site, nor the most prudent use of resources.

Using the technical expertise of our consultants, Anaconda has developed a new reclamation plan based on the best available information about mine conditions and state-of-the-art reclamation techniques. We call this plan "The 1985 Multiple Land Use Reclamation Plan." It is far superior to any of the alternatives examined in the draft EIS because it will provide for multiple beneficial uses of the land including grazing, water resources development, recreation, fish and wildlife habitat and future mining use. Anaconda has submitted this plan to the department for their approval and has withdrawn the Green Book proposal.

While Anaconda has only limited contractual and regulatory obligations regarding reclamation of the Jackpile-Paguate Mine, we assume a responsibility to return the site to a state free from unreasonable risk to health and safety. Recognized scientific experts have determined that the mine in its present state has minimal safety concerns. The mine does not have significant health and safety risks from radioactivity, unsafe movement of pit walls and dump slopes or air and water contamination. To mitigate any small remaining risks, Anaconda has proposed the 1985 Multiple Land Use Plan to reclaim the mine site to protect the environment, leave a safe, stable landscape and to promote multiple uses of the formerly mined area.

This plan includes development of water resources by constructing a water reserve in the North Paguate Pit area, and Mr. Sanchez is indicating on the map over there where that is located. The reservoir would provide approximately 1,000 acre feet of storage capacity, and, within a few years, the water quality would approach the quality of the Rio Paguate.

Such water could be used to support fisheries, irrigation, recreation, wildlife and livestock watering. The plan proposes to leave the protore piles and other mineral resources readily accessible for processing. The protore piles are to be removed from the stream channels, sloped to three to one or flatter and covered with 12 to 18 inches of topsoil and revegetated in place.

The Jackpile and the South Paguate pits would receive limited backfill material. They would be topsoiled and revegetated to provide stable topography and to reduce chronic water ponding. The total area in these two pits that may result in decreased vegetative productivity would be limited to about 15 acres.

The stream channels would be cleared of dump material for a distance of 50 feet of the stream centerline, and this roughly equates to the 100-year flood plain.

All underground entries will be sealed and covered. Dumps with significant risk to erosion to the streams and all dumps interior to the pits will be sloped three to one or flatter and revegetated.

All improvements will be left for the use by the pueblo, and the entire disturbed area will be revegetated similar to nondisturbed areas. A detailed design of the plan will be submitted to the record prior to the close of the period for written comments.

While Anaconda willingly proposes reasonable reclamation of the Jackpile-Paguate Mine site, we are critical of the tendency of many people involved in the process to negotiate for money without regard to what reclamation activities that money will be used for or whether those activities are necessary. We at Anaconda are determined to insure a competent discharge of our obligation and do this in a cost effective manner.

We propose the above-described 1985 Multiple Land Use Reclamation Plan and request approval to implement this plan. We resist the unnecessary embellishment of reclamation procedures which do not meet reclamation needs in a cost effective manner.

Anaconda has carefully examined the scientific and legal basis for reclamation of the Jackpile-Paguate Mine and has concluded that there is no basis for the pueblo or the department to compel more than minimal reclamation, such as securing underground openings and fencing the mine to prevent unauthorized entry. Nonetheless, Anaconda has chosen to offer the 1985 Multiple Land Use Reclamation Plan, which goes far beyond Anaconda's minimal legal obligations, in order to preserve its reputation as a reasonable corporate citizen and foster prompt agreement among the parties on a reclamation plan that can be immediately implemented.

Anaconda Minerals Company has carefully reviewed the draft EIS of the Jackpile-Paguate Reclamation Project and has concluded that the draft EIS must be withdrawn, completely rewritten and republished for public comment. The basis of this position will be addressed by Susan Smith, Anaconda's legal counsel.

Thank you, ladies and gentlemen.

MR. RAMPTON: Thank you, Mr. Stirland. Ms. Smith.

MS. SMITH: Good afternoon. I'm glad to see all of you here. We were afraid that we would be talking to an empty room today.

I'm Susan L. Smith. I'm an attorney with the law firm of Holland and Hart. We serve as counsel to the Anaconda Minerals Company regarding the Jackpile-Paguate Reclamation Project.

I appreciate this opportunity to briefly outline Anaconda's criticisms of the Draft Environmental Impact Statement. Anaconda has carefully reviewed the draft, using not only Anaconda technical personnel, but also outside scientific experts and outside counsel. Based on this review, Anaconda has reluctantly concluded that the Draft Environmental Impact Statement is inadequate and must be substantially rewritten.

We have five major criticisms of the draft EIS. First, the draft is based on a faulty legal foundation. It improperly assumes the Department of the Interior can force Anaconda to perform whatever reclamation effort it deems appropriate. Anaconda has conducted a searching analysis of its contractual and regulatory obligations. This analysis is reported more fully in Anaconda's preliminary comments, which have been submitted to the department already, but I will attempt to briefly summarize for your information Anaconda's obligations.

Anaconda has extremely limited reclamation obligations under the leases, approved mining plans and applicable regulations. The 1952 and 1963 leases on which all open pit and uranium -- underground uranium mining was conducted contain no specific reclamation obligations. Anaconda is essentially obligated only to leave the mine site in a condition that does not pose an unreasonable hazard to human health or safety. While the 1976 lease does contain some specific reclamation obligations, there were only a few ancillary operations conducted on that lease. Furthermore, apart from reclaiming the main road, all reclamation obligations under that lease have already been satisfied.

The approved mining plans, with the exception of the PW 2/3 plan, also do not contain any specific reclamation obligations. Anaconda believes that enforcement of the provisions of the PW 2/3 plan would impose substantial costs without any significant environmental benefits and, therefore, would be arbitrary and capricious.

The draft EIS also assumes authority to impose reclamation requirements under the Bureau of Indian Affairs mineral leasing regulations, Bureau of Indian Affairs reclamation regulations and the Bureau of Land Management operating regulations. This is not correct. The mineral leasing regulations do not impose any specific reclamation requirements. The reclamation regulations do not apply because the leases were executed long before these regulations were issued. Finally, the operating regulations again do not impose any specific reclamation obligations and, in fact, limit reclamation requirements to those imposed by the leases and approved reclamation plans.

In summary, Anaconda's legal obligations are limited to, (1), leaving the mine site in a condition that does not pose a significant risk or significant health hazard; and, (2), comply with the terms of the PW 2/3 plan, if it is deemed sufficiently specific and reasonable in order to be enforced.

Compliance with these legal obligations requires very limited reclamation activities, such as plugging vent holes and perhaps fencing the mine. The 1985 Multiple Land Use Reclamation Plan, as well as the alternatives considered in the draft, far surpass Anaconda's limited legal obligations. The 1985 plan will provide for substantial backfilling and resloping, complete revegetation of the site and development of a water storage reservoir. However, everyone must realize that the department lacks authority to compel Anaconda to perform any of these plans. Anaconda offers to perform the 1985 Multiple Land Use Reclamation Plan, but only if there is a consensus, an agreement among all parties, the Pueblo of Laguna, the government, and Anaconda that the plan represents a reasonable and appropriate approach to reclamation.

Our second criticism of the draft is that it improperly discarded the no-action alternative based on the erroneous assumption that the site posed a significant risk to human health due to the perceived radiological risk. The draft relies on an estimated radiological health risk derived from a background report prepared by Momeni, et al., and you'll hear a lot about that report this afternoon.

As Dr. Leonard Hamilton of Brookhaven National Laboratory and Dr. Leo Lowe of SENES Consultants will explain later, the Momeni report contains serious scientific errors, overestimating the radiological health risk by at least a factor of 100 to 200. The report estimates that the mine, if left unreclaimed, would cause between 95 and 243 additional cancer deaths. However, as Drs. Hamilton and Lowe will testify, the actual radiological risk to the entire regional population within 50 miles of the mine over a 90-year period is less than one excess death, even if the mine is not reclaimed at all.

This risk is so low compared to other everyday risks, that no reclamation, absolutely no reclamation is justified to further reduce the radiological health risks. The comments of Drs. Hamilton and Lowe and of Dr. Hersloff, who will discuss other problems with the Momeni report, constitute significant new information which, as a matter of law, requires publication of either a supplemental Draft Environmental Impact Statement or a revised draft EIS.

Third, the range of alternatives considered in the draft is inadequate, and the draft must be revised to include other alternatives. The draft does not include discussion of any alternative less extensive than the Green Book proposal. It, therefore, biases the reader in favor of the DOI monitor and drainage alternatives which are rather neatly bracketed between the 1982 Green Book proposal and the Laguna alternative.

Further, the draft fails to discuss any alternative involving land uses other than grazing. Anaconda requests that serious consideration be given in a revised draft to both a minimal reclamation plan and to Anaconda's proposed 1985 Multiple Land Use Reclamation Plan.

Our fourth criticism is that the draft does not contain any cost-benefit analysis and does not even quantitatively analyze the incremental costs and

benefits expected from individual features of the various plans. This drastically reduces the usefulness of the draft as a decision-making tool. For example, the 1985 plan may allow over an extended period of time a maximum of 15 acres to become salt playas with occasional ponding, which would not be productive land for grazing.

Even if this occurred, the value of those 15 acres for grazing purposes would be approximately \$15,000. By contrast, the cost of backfilling and recontouring the site in order to eliminate the possible development of these salt playas will be on the order of \$9 million.

Obviously, if the draft is revised to adequately assess the costs and benefits of preventing 15 acres of salt playas, a reasonable decision maker will choose the approach of the 1985 Multiple Land Use Reclamation Plan.

The final problem with the draft is really not a single problem but a collection of problems. The draft is filled with very significant factual and analytic errors, far too numerous to list now, but many of these errors will be discussed by the distinguished group of scientific experts testifying today.

Drs. Hamilton, Hersloff and Lowe will discuss the most important errors in the radiation section. Mr. Ben Boyd of Morrison-Knudsen will discuss the inadequacy of the methods used by the department to estimate volumetrics and reclamation costs. Mr. Fred Kelsey will mention the errors he found in the data used to make volumetric calculations. Dr. Ben Seegmiller will note the mistaken assumptions and inadequate methods used in estimating stability as well as the clearly mistaken conclusion the department reached about the stability of the waste dumps and the highwalls.

Drs. Ken Ludeke and Warren Keammerer will discuss the mistaken analysis of vegetation impacts that occurred because of an erroneous interpretation of the 70-percent success criterion. Finally, Mr. Larry Murdock of Dames and Moore will discuss the hydrology section of the draft. These experts will also address the anticipated results from the 1985 Multiple Land Use Reclamation Plan.

I would now like to introduce Dr. Leonard Hamilton of Brookhaven National Laboratory, who is an internationally regarded expert on the health effects of radiation. Thank you.

MR. RAMPTON: Thank you, Ms. Smith. Mr. Hamilton.

MR. HAMILTON: Ladies and gentlemen, members of the panel, my name is Leonard D. Hamilton. I am currently, and have been since the inception, head of the Biomedical and Environmental Assessment Division at the Brookhaven National Laboratory. The Biomedical and Environmental Assessment Division is an interdisciplinary group that assesses the health and environmental impacts of all energy sources from exploration to end-use. The views expressed here are my individual views and do not necessarily represent the official views of Brookhaven National Laboratory.

At the request of Anaconda Minerals Company, I reviewed the radiation impact analysis contained in the Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project and the 1983 background

report prepared by Momeni, et al., entitled "Radiological Impact of Jackpile-Paguate Uranium Mines -- An Analysis of Alternatives of Decommissioning."

The analysis of radiological health impacts summarized in the Draft Environmental Impact Statement is essentially based on detailed evaluations given in the 1985 Momeni report. The DEIS analysis is fatally flawed because the 1983 Momeni report contains serious scientific errors. These errors are of such size that the section of the Draft Environmental Impact Statement dealing with radiological health impacts must be rewritten to correct them.

To estimate the potential radiological health effects from a radiation source such as the Jackpile-Paguate Uranium Mine, one must first define the amount of radiation given by the source, known as the source term. Then one must predict how this radiation is dispersed and estimate the exposure or the dose of radiation received by nearby and regional populations.

Finally, one must use a dose-response relationship to estimate the health effects from a given amount of human radiation exposure. Because the Momeni report erred in each of these tasks -- estimating the source term, estimating the radiation exposure and doses, and applying a proper dose-response relationship -- the Momeni report and the Draft Environmental Impact Statement grossly overestimate the radiological health effects from the mine.

The most serious error arises from the dose-response calculations used in the report. The dose-response calculations are in error by at least a factor of 100, so the radiological health effects from the mine are overestimated by at least that amount.

The error in the dose-response calculations appear to be due to the improper use of an unvalidated and very poorly-documented computer program known as the PRIM code, which was used by Momeni to translate estimated radiation doses into predicted radiation-induced cancer mortality. I say "appears" because the Momeni report is written in a way that makes it difficult to determine the dose-response relationship actually used or the origin of the errors in the dose-response calculations.

Other errors in estimating the health effects arise from the Momeni report's use of another unvalidated computer program known as the UDAD code to estimate exposures and doses from radiation at the mine. Parenthetically, the UDAD code was referred to by one of its Nuclear Regulatory Commission program managers as "significantly and irreparably deficient" and replaced by the NRC with another computer program known as MILDOS.

The exact amount of error caused by use of this computer program cannot be determined without conducting a complete reanalysis of the radiological health effects of the mine. Such reanalysis, which would essentially require replication of the Momeni report, was beyond the scope of my task. However, my review of the UDAD code indicates that it incorrectly estimates the doses received by individual organs and that it overestimates dispersion and, thus exposure to individuals.

Finally, the Momeni report contains errors in the estimated radiation source term which lead to an additional overestimate of the radiological health effects of the mine. These errors were identified by Dr. Lyda Hersloff and will be discussed later by her.

I have estimated the projected radiological health risk for the regional population under the no-action alternative using the radiation sources, exposures and doses given in the Draft Environmental Impact Statement and the 1983 Momeni report, despite reservations about their accuracy. My analysis is also based on the conservative linear no-threshold assumption about the dose-response relationship, which means my estimates are, if anything, too high.

Under the no-action alternative, I estimate that in the regional population over a 90-year period, the upper boundary of health risk would be three excess deaths. The upper boundary health risk is a term used by scientists to define a reasonable upper limit in a projected health effects estimate derived from use of the conservative linear no-threshold dose-response relationship, the lower limit estimate of which could be zero. This represents an individual lifetime risk of radiation-induced cancer of 6.5 in one million. This is an extremely small, indeed a miniscule risk.

Bear in mind that the estimated number of cancer deaths is just that, a statistical estimate based on adding together this tiny risk to hundreds of thousands of people over 90 years. The odds are more than 100,000 to 1 for each individual that's over 90 years he or she will die of some cause other than that of cancer induced by residual radiation from the mine site. Since the commonest things occur most often, this is in fact what will happen.

I've also estimated the radiological health risk for the regional population -- that, by the way, is the population within 50 miles -- if the Anaconda 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Mine were implemented. According to preliminary review by SENES Consultants, the Anaconda Reclamation Plan would reduce the particle and radon source terms to approximately 15 percent and 60 percent of the no-action values. Such reductions might lower the lifetime risk of cancer mortality by roughly a factor of three. This would result in a total risk to the entire regional population over a 90-year period of approximately one radiation-induced cancer death. Again, bear in mind the conservative assumptions used and the upper boundary and hypothetical nature of this risk.

Moreover, if this tiny risk to the regional population were adjusted to take into account the overestimation of the source terms -- radon and airborne particles releases -- in the Momeni 1982 report that have been reported by Dr. Hersloff and the overestimates I have mentioned in the UDAD code, this minute risk would be reduced still further.

In reality, the radiological health risk for the regional population from the mine is a small fraction of the risk that one ordinarily encounters from variations of natural background radiation when one travels as little as five to ten miles.

The upper boundary individual lifetime risk of cancer for an individual in the regional population from radiation exposure under the no-action alternative, 6.5 in one million, is about 1.5 percent of the risk from cosmic rays of living in Denver, Colorado, compared to New York or 1.5 percent of the risk from radiation of living in a masonry rather than wood building. Both the latter are approximately 70 times riskier than living within 50 miles of the Jackpile-Paguate Mine.

I have also estimated, although the Momeni report did not, the radiological health risk to the maximally-exposed individual based on the doses given in the Momeni report. The conservative upper limit estimate of risk to this individual is 1.13 in 10,000. Essentially 1 in 10,000. You should note that the assumptions made in the Momeni report about the exposure of the hypothetical maximally-exposed individual are most unrealistic.

The Momeni report assumes that this individual is a resident of Paguate who stays in the village 24 hours a day for his entire life and exclusively consumes meat from cattle grazed on grass contaminated with airborne dust from the mine. You should also note that I conservatively assumed that all the inhalation and ingestion dose is due to more damaging high-LET radiation and made no correction for the fact that part would be less damaging low-LET radiation. Also, this estimate does not take into account overestimation of the source terms and overestimates in the UDAD code which, when corrected, would reduce this risk even further.

Even with these extremely conservative assumptions, individual lifetime risk of cancer in the most exposed individuals at Paguate under the no-action alternative is 1.13 in 10,000, roughly the same as the lifetime risk of dying due to excess cosmic rays received by living in Denver.

On this view graph, I have also included some other comparisons of similar lifetime risks, electrocution, falling -- that should not be falling off a building, but falling off a building -- and that, of course, is accidental drowning, not accidental drowning. I apologize for the two typos on that viewgraph.

Finally, I have estimated that implementation of the Anaconda 1985 Multiple Land Use Reclamation Plan would reduce the estimated lifetime risk from 1 in 10,000 to 3.85 in 100,000. If that estimate were corrected to take into account the overestimates of the source term and the overestimates of the UDAD code, this small, very conservatively-estimated risk to the hypothetical maximally-exposed individual would be reduced still further.

In summary, the 1983 Momeni and the Draft Environmental Impact Statement, drastically overstate the radiological health risk associated with the no-action alternative for the regional population. The actual risk is miniscule and would be vanishingly minute after implementation of the Anaconda 1985 Multiple Land Use Reclamation Plan for the Jackpile-Paguate Mine. Even the estimated risk to the maximally-exposed individuals at Paguate is very small and would become even smaller after the proposed reclamation.

I would now like to introduce Dr. Lyda Hersloff, a radiation ecologist, who will address the radiology source terms of the mine. Thank you.

MR. RAMPTON: Thank you, Dr. Hamilton. Dr. Hersloff.

MS. HERSLOFF: Good afternoon, ladies and gentlemen. My name is Lyda W. Hersloff. I have a Ph.D. in radiation ecology and two master's degrees, one in health physics and one in ecology. I am presently self-employed as a consultant in the areas of radiation ecology and health physics. My personal experience includes environmental monitoring, licensing and reclamation of uranium mines and mill sites. My research experience has included studies concerning radon emanation and radon in underground uranium mines.

Anaconda Minerals Company requested that I evaluate the releases of Radon-222, a radioactive gas, and airborne radioactive particulates from the Jackpile-Paguate Uranium Mines as used in the draft EIS. This evaluation was conducted in order to determine the accuracy of the projected exposures to populations in the vicinity of the mines as well as the accuracy of projected health effects.

Several factors determine the total releases from any mine site. These include, among others, the acreages of exposed radioactive material and radioactivity of that material. Estimation of the amount of radioactive material released from a site is basically accomplished by multiplying the concentration of radioactive material times the total acreage of the exposed radioactive source times a dispersion coefficient.

At the Jackpile-Paguate Uranium Mines, exposed uranium ore-bearing material is the Jackpile Sandstone. This is an easily identifiable material based on its whitish color, as can be seen on the aerial photograph. Based on this aerial photograph, contour maps and personal inspection, I determined that the area of exposed Jackpile Sandstone material remaining in the pits is about 392 acres, and the area associated with dumps, waste piles, protore miles and miscellaneous sources is 567 acres, for a total of 959 acres.

Estimates of the pit and dump acreages used by Dr. Momeni and Associates in the Argonne report were much greater. They estimated the area of exposed radioactive material in the pits to be 1,110 acres and, for the dumps, stockpiles and miscellaneous areas, to be 1,782 acres, for a total of 2,792 acres. From my evaluation of the acreage containing exposed radioactive material, it is evident that acreage estimates used by Argonne National Laboratory are too high by nearly a factor of 3.

Based on determined acreages of exposed Jackpile Sandstone and the uranium concentrations for the various exposed areas, the release rates of Radon-222 and airborne radioactive particulates can be calculated. In my analysis, the release rate of Radon-222 from the pits, dump areas and other miscellaneous sources, such as rail spurs and roads is 3,206 Curies per year. This value is only 57 percent of the total Radon-222 release rate of 5,588 Curies per year, as estimated by Dr. Momeni.

Since the uranium concentrations and dispersion coefficients used to calculate the release rate by both myself and Dr. Momeni, et al. were the same, the difference between our estimates of the total Radon-222 release rate can be explained by the large discrepancy in acreages.

Again, for the pits, I estimated a total of 392 acres of exposed Jackpile Sandstone material; whereas, the Argonne report estimated 1,010 acres. Dr. Momeni and Associates apparently used the total disturbed acreages of the various pits assuming improperly that they contained an area of exposed Jackpile Sandstone equal to the original area of mineralized material. There was no consideration for the extraction of the material, followed by backfilling of some of the pit areas and recharge of water into the pits.

In addition, 485 acres of dump site material which, based on its uranium concentration, is not classified as radioactive material according to the Environmental Protection Agency and which has already been covered by from 12 to 18 inches of topsoil, was incorrectly included in the Argonne report as contributing to the mine source terms.

In estimating the airborne radioactive particulate emissions, I used the same method as I described earlier; that is, the acreage times the uranium concentration times the dispersion coefficient. Based on the above method, I estimated the airborne radioactive particulate emissions to be 0.43 Curies per year. This release rate is approximately 42 percent of that determined by Argonne National Laboratory. Again, since exposed acreage is one of the key factors in the estimation of release rates, the overestimation of acreage will, of necessity, also result in the overestimation of airborne particulate release rates.

Overestimation of release rates of both Radon-222 and airborne radioactive particulates has the effect of overestimating the projected doses to people as well as the estimated health effects. Doses and health effects are proportional to the estimated release rates. The doses from inhalation of radon and airborne particulates will, therefore, be less by the same proportions as given above. Due to the error in estimated releases alone, the projected doses and health effects from Radon-222 and airborne radioactive particulates must be reduced to approximately 57 percent and 42 percent respectively of those given by Argonne National Laboratory.

Anaconda Minerals Company proposes to cover the dumps, waste piles and protore piles with from between 12 to 18 inches of cover material. The pits will receive backfill material, which will also be covered with from 12 to 18 inches of cover material. This depth of cover is estimated to reduce the average Radon-222 released by 55 percent to approximately 1,458 Curies per year. In addition, recharge water coming into the pits is expected to fill within the backfill material, thus covering more area of the exposed mineralized material in the pit area.

Since the pit areas are the major contributor to the release of Radon-222, it is anticipated that the reduction in Radon released following final reclamation will be substantially greater than 55 percent. Further, covering of the exposed uranium ore-bearing material will also essentially eliminate airborne radioactive particulates and the external gamma radiation resulting from the mine source.

At this time, I'd like to introduce Dr. Leo Lowe of SENES Consultants, Limited, who will discuss radiation health risks and exposure pathways. Thank you.

MR. RAMPTON: Thank you, Dr. Hersloff. Dr. Lowe.

MR. LOWE: Good afternoon ladies and gentlemen and members of the panel. My name is Leo Lowe. I am a senior environmental physicist at SENES Consultants, Limited, a group of scientists and engineers who specialize in the area of energy, nuclear and environmental sciences. SENES has extensive experience in the environmental and health aspects of uranium mining and have carried out or supervised more than 50 studies in the areas of dose assessment, radiation protection of workers and the public, dose estimation for epidemiological analyses, radioactive waste management and evaluation of scientific data related to uranium miner regulations. I earned a Ph.D. in nuclear physics from McMaster University in Hamilton, Ontario, and have eight years' experience in analyzing the environmental and health aspects of the radiation.

In June of 1985, SENES Consultants, Limited, was retained by the Anaconda Minerals Company to review the radiological impact of the Jackpile-Paguate reclamation project as described in the Draft Environmental Impact Statement and as also described in the report entitled "Radiological Impacts of Jackpile-Paguate Uranium Mines -- An Analysis of Alternatives of Decommissioning," prepared by M.H. Momeni, et al.

The main points of our review are as follows: The analysis of radiological health impacts given in the draft EIS is based on the evaluations in the Momeni report. The Momeni report calculates potential radiation exposures and doses to various members of the population for each decommissioning alternative and then converts these doses into potential numbers of health effects.

Two initial comments apply. First, the presentation of the exposures and doses in the Momeni report was difficult to evaluate because of apparent inconsistencies within the report. For example, Momeni's estimate of dose from airborne dust that is deposited on the ground is inconsistent with the amount of deposited dust. Second, the exposure and dose calculations in the Momeni report appear to miscalculate the dose for certain radiation pathways to man by more than two orders of magnitude; that is, by more than a factor of 100.

In order for us to appreciate what the potential effects of the uranium mine might be, we undertook to calculate the dose to the potentially most exposed person under the no-reclamation option. It should be noted here that these calculations were done independently with Dr. Hamilton.

Although we used a slightly different methodology, our results are consistent with Dr. Hamilton's results. The most-exposed individual would be a Paguate resident who stayed in the village 24 hours a day for his entire life and whose entire annual meat intake came from cattle grazing on grass contaminated with airborne dust from the mine. Obviously, very few, if any, Paguate residents fit this profile.

Our calculations show that this individual might receive a maximal annual dose of about 18 millirems per year. This is likely to be a high estimate because of the conservative methods we used in our calculations. For comparison purposes, this is about 10 percent of the total radiation exposure that the individual would receive from normal background sources of

radiation. It is less than the differences in exposure people receive just by living in different parts of the country with different background radiation levels.

The area in which we found the Momeni report to be most potentially flawed -- I'm sorry -- most seriously flawed was in the calculation of the number of potential cancers resulting from the radiation exposure due to the mines. Unfortunately, the calculations in the Momeni report were based on a computer program which, to our knowledge, has not been fully documented in the public literature.

Our calculations indicate that the total lifetime risk of fatal cancer from the potentially most-exposed individual living continuously near the mine is increased by 0.013 percent or 13 one-thousandths of one percent. For comparison, the present lifetime risk of dying from cancer in the United States is about 18 percent, a factor of more than 1300 times higher.

Now, this estimate is for the most-exposed individual living near the mine. The average risk to people living in the region of the mine is much less. For the entire 90-year period used to calculate long-term effects in the Momeni report, we project that the number of radiation-induced fatal cancers would be about 1. This is a factor of about 100 to 200 less than the numbers of cancers predicted in the Momeni report. It seems that the major source of this discrepancy is in the translation of radiation dose to health effects as carried out in the unpublished computer program used for the Momeni report.

All of the calculations I have noted so far are based on the assumption that there will be no reclamation of the mine site. However, in 1985, Anaconda prepared a Multiple Land Use Reclamation Plan for the mine. This plan would reduce the releases of radioactivity from the site and, hence, would also reduce the potential risk to the exposed population. If the Multiple Land Use Plan were implemented, we estimate that for the 90-year modeling period, there would be less than 0.5 radiationally-produced cancer deaths in the regional population. This is a trivial risk when compared to the more than 100,000 cancer deaths expected from all causes in the same population in the same period.

It should be noted that recent recalculation of the releases of radioactivity from the mine by Dr. Lyda Hersloff suggests that the release estimates used in the Momeni report are too high by about a factor of 1.8 for radon and about 2.4 for dust. This recalculation would reduce our health effects estimates by corresponding factors.

In summary, our review indicated that, (1), the documentation of the analyses presented in the Momeni report is incomplete, and the report appears, in parts, to be internally inconsistent; and, (2), the estimates of risk reported in the Momeni report are too high by about a factor of 100 to 200 mainly because of the error in translating dose into health effects. If the apparent error in source terms reported by Dr. Hersloff is also taken into account, the estimates of risk in the Momeni report are too high by about a factor of roughly 200 to 400. Thank you.

MR. RAMPTON: Thank you, Dr. Lowe.

MR. LOWE: This concludes our discussion of the radiological assessment of the mine. I'd like to introduce our next speaker, which would be Ben Boyd of Morrison-Knudsen who will discuss volumetrics and cost estimates for the various reclamation options. Thank you.

MR. BOYD: Good afternoon. My name is Ben Boyd, Morrison-Knudsen Project Manager for surface mine engineering projects. Morrison-Knudsen Corporation, M-K, is a worldwide engineering, construction and mining company. Our area of concern for this project has been the volumetrics, methods and cost for actual implementation of the reclamation plan.

Anaconda Minerals Company first retained M-K in 1980 to assist them in preliminary planning for reclamation at the Jackpile-Paguate Mine area. A plan was developed in 1980. Then, in 1982, this plan was refined and presented by Anaconda to the DOI. This 1982 plan formed the basis for the Draft Environmental Impact Statement issued by the DOI in February, 1985. We are very familiar with reclamation planning for this mine area.

In May, 1985, Anaconda again retained M-K to review the three reclamation alternatives in the DEIS. We were also asked to review and update the 1982 Anaconda reclamation proposal and to assist in the development of the 1985 Multiple Land Use Reclamation Plan.

In addition to the no-action alternative and a minimum reclamation alternative that would require little or no material movement, there are already now five reclamation proposals for the mine area. They are: Anaconda 1982 Green Book Reclamation Proposal, Anaconda 1985 Multiple Land Use Reclamation Plan, the DOI Monitor Plan, the DOI Drainage Option and the Pueblo of Laguna Reclamation Plan.

The implementation of any of these plans should produce a stable post-reclamation environment and restore the air to useful purposes. There are, however, significant differences in the cost of implementation for these plans. M-K has performed a systematic review and design of the alternatives using accepted engineering practices to develop volumetrics, methods and costs to implement each of the proposed alternatives.

M-K did not analyze the cost of the no-action alternative or the minimum reclamation alternative. Anaconda Minerals has provided estimates for these two alternatives.

The M-K study was performed using an experienced team of specialists in mining, reclamation and cost estimating. Every effort was made to treat each of the alternatives on an equal basis.

The cost and material movement associated environmental disturbance required for implementation is significantly different for the seven proposed plans. The required material movement and estimated cost for each of the alternatives are summarized on this chart.

As you can see, the cost of implementation, estimated cost for implementation for the alternatives range from \$2.1 million to more than \$70 million.

The DOI in its assessment estimated the difference in reclamation cost between the 1982 Green Book Plan and the Laguna Plan at \$3.3 million. Using accepted estimating methods, we estimate that the actual difference is \$28 million.

The draft EIS has underestimated this incremental cost by a factor of 8. As far as our procedures used to develop the volumetrics, methods and cost, cross sections were developed to accurately reflect pre-mining, post-mining and post-reclamation topography for each of the proposed plans. These cross sections were then used to calculate the volumes of material moved in each alternative. The methods employed could be suspected to provide results with an accuracy level of five to eight percent. These methods are widely accepted within the industry.

Each of the proposed alternatives were examined with comparative studies made where appropriate to select economic, technically feasible methods to implement the plan. The methods employed are comparable, practical methods. Each alternative was scheduled over a time period appropriate for the material to be handled, with maximal use of equipment.

The cost to implement each alternative was estimated using standard feasibility level methods. Each operation was estimated separately, then combined to calculate total cost for the alternative.

The level of engineering, the basic data available and estimating methods employed can be expected to provide results that are accurate within 15 percent.

A second task of the M-K engineering team was to perform an evaluation and review of the alternative reclamation plans as presented in the draft EIS. The conclusion of this evaluation is that the DOI presentation is generally technically inadequate, misleading in many respects and strongly biased in favor of the DOI and Laguna alternatives. In addition to the cost discrepancy noted above, some specific items are: (1), the DOI overstates the material required to be moved for the 1982 Anaconda Plan and the DOI Monitor Plan. They have underestimated the material required for the Laguna Plan.

Item 2, the DOI calculates that reclaimed surfaces in the mined areas will be 40 to 70 feet higher in elevation than specified by Anaconda. This would require 25 to 50 million cubic yards more material than is designated for backfill. We're unable to determine the source of this material.

Item 3, for the drainage option, M-K calculations show that it will be necessary to excavate 4.9 million cubic yards of material to construct drainage channels for the three mined areas. The DOI calculates less than 1 million cubic yards.

Item 4, the DOI indicates that dump slope reduction is essentially eliminated in the Laguna proposal because of the specified backfill. M-K has determined that the reduction in required dump slope work, as a result of dump removal to backfill the South Paguate Pit, is less than 5 percent. Our calculations indicate dumps in the vicinity of South Paguate Pit contain more than enough material to meet the requirements. All other dumps would still require recontouring.

Item 5, the DOI cost estimates are, at best, order of magnitude. The methods employed do not consider equipment utilization, job scheduling or other factors. The estimated costs are obviously biased to favor the DOI and Laguna proposals.

The DOI, when comparing the 1982 Anaconda proposal to the Laguna proposal, estimates that the required material movement increases by 50 percent while the estimated cost is increased only 6 percent. An effort involving this amount of money deserves a better estimate of the cost involved.

Item 6, the data and mapping prepared by the DOI was very limited and difficult to interpret. M-K has attempted to reconcile the differences in the volumetrics between M-K and DOI results, but has had little success. Additional back-up data and mapping relating to each reclamation alternative is necessary to further address the volumetric variations and reclamation costs as presented by the DOI.

I'd like to introduce next Mr. Fred Kelsey with the Anaconda Company who has some specific comments on mapping and modeling work performed by the department.

MR. RAMPTON: Thank you, Mr. Boyd. Mr. Kelsey.

MR. KELSEY: Good afternoon. My name is Fred Kelsey. I am currently employed by Anaconda Minerals in the capacity as a mining systems analyst. My college background includes training in the fields of geology, geophysics and computer science.

My current work with Anaconda encompasses the feasibility, evaluation, design, development, operation and maintenance of computer systems used by the Geology, Mining Technology and Evaluation Departments. My work also involves geostatistical reserve calculations, mine modeling and participation in evaluation projects relating to potential mine or reserve acquisitions.

My assignment was to reconstruct the digitized topography that was provided by the BLM, reformat and validate that data into a form that was suitable for use by Anaconda's various computerized surface mine planning systems.

The acquisition of the BLM's digitized Jackpile-Paguate topograph was a five-month process that began with a request for the data in March, 1985. Anaconda Minerals Company has not received the computerized post-reclamation digitized contour data to date, even though our original request was made seven months ago.

After receiving the topo data, I made several verbal requests of the BLM technical consultants to send me explicit instructions on how to decipher the computer tapes. The only information that they could give was that the topo data was in the UTM coordinate system. As a result of this lack of documentation, I spent a considerable amount of time and effort creating computer programs to modify the topo data into a usable format.

The following procedures were used to convert the BLM data into a format from which contour maps could be generated. First, the data was converted through the New Mexico State plane system, then the coordinates of each topo

point had to be adjusted to give true coordinates based on an algorithm that originally took considerable time to assemble. The elevation for each point was then averaged with all other points within .3 feet. The reason for this step was that the original points were split into two points having elevations five feet above and below the correct elevation. Finally, the data was contoured using a computerized contouring program. Any bad elevations showed up as elevation anomalies and, therefore, were detected.

After correcting the major errors in the contour elevations, the amount of topography data was reduced. This reduction of data did not affect the computerized contouring results when compared with the BLM supplied topography maps. However, this data reduction did decrease computer run times. Before data reduction, there were over 3 million topo points. After data reduction, the same computerized contouring results were achieved with less than 800,000 points.

I found two basic types of errors within the BLM's topo data. That first error was that of missing blocks or where the topo data in the blocks were totally wrong. This type of error represented a small but significant portion of the 1984 and 1951 topograph data. This type of error was very easily detected.

The second type of error was where the elevations along a contour line were wrong. Almost every block of data had this type of data to varying degrees. Computer maps showing most of the above two types of errors were generated by Anaconda. Computer maps showing the corrected topography were also generated.

It appears that the BLM did not find the topography errors that I have mentioned. I find it surprising that the BLM did not notice these errors, since they could be easily detected with any contouring package. These errors may be contributing factors in the discrepancies between Anaconda and the BLM in volumetric estimations. It is impossible to quantify the effect that the topography errors would have had on the BLM in volumetric studies.

Because of questions that arise from the errors found, the reliability from the digitized computer data is highly suspect. To continue further analysis with this data would require a detailed comparison between the digitized computer data and the topography maps that were supplied by the BLM.

Since we never received the post-reclamation topography and due to the problems found with the computerized data, it was unrealistic to proceed any further with computer analysis of this data.

I would next like to introduce Dr. Ben Seegmiller of Seegmiller International, who will address dump and highwall stability.

MR. RAMPTON: Thank you, Mr. Kelsey. Dr. Seegmiller. I might say at this point that the testimony that's coming in is quite technical. I'm sure that if anyone wants to analyze it and review it, all of these documents that have been presented will be available at the Bureau of Land Management office for detail of review, and the ones that come in later will also. Mr. Seegmiller.

DR. SEEGMILLER: Good afternoon, ladies and gentlemen, members of the panel. My name is Ben Seegmiller, and I'm principal consultant of Seegmiller

International, a mining geotechnical firm that handles rock and soil stability problems. I received my Ph.D. in mining engineering in 1969 from the University of Utah. I also have a master's degree in mining engineering, and a bachelor's---excuse me---a bachelor's degree in mining engineering and in geological engineering.

My mining related experience is in excess of 26 years. I have been a consultant on mining stability problems for the past 16 years. Consulting assignments have involved me in projects throughout North and South America, Africa, Europe and the People's Republic of China. I'm a registered professional engineer in the State of New Mexico as well as ten other states and provinces.

During the past six years, Seegmiller International has performed a wide variety of stability related projects at the Jackpile-Paguate Uranium Mine. These studies have included underground subsidence potential, surface highwall stability and waste dump stability. Most recently, a major study was completed which involved the reevaluation of the Jackpile highwall stability, North Paguate Pit highwall stability and waste dump stability.

I would like to briefly discuss our conclusions about the stability of the Jackpile highwall, the stability of the North Paguate highwall after the proposed reservoir is built and the stability of the waste dumps. A more detailed discussion of these subjects is contained in our written statement, which has already been submitted to the Department of Interior with Anaconda's preliminary comments on the draft EIS. A copy of our final report to Anaconda will be submitted to the DOI at the end of the public comment period.

First, based on our recent and extensive study of the Jackpile highwall, we have concluded that the highwall is and will remain stable if the no-action alternative is adopted. Thus, the conclusion of the draft EIS that the highwall will fail is wholly erroneous.

The Jackpile highwall was originally evaluated for stability in July 1980, by Seegmiller International. That study assumed that all of the upper sandstone units had cohesion levels of 4,000 pounds per square foot. In addition, the initial study used the very conservative analysis method known as the Hoek method. The study concluded that the Jackpile highwall would require a buttress against its west toe to maintain a minimum safety factor of 1.5 and remain stable over the very long term.

In May, 1985, we made a complete reevaluation of the Jackpile highwall stability. The study involved detailed field mapping and strength testing. It was concluded that the original study had underestimated the cohesion level in the sandstones.

The upper sandstones were concluded to have cohesion levels ranging from 6,000 pounds per square foot to as high as 20,000 pounds per square foot, depending on the individual stratum. The 1985 study also employed more sophisticated and accurate analyses, including the Modified Janbu and Modified Bishop methods. Thus, using the best available information about the cohesive strength of the sandstones in the highwall and the most sophisticated and accurate methods, we reanalyzed the stability of the highwall.

The results showed that the Jackpile highwall has a minimum safety factor of 1.542 without a buttress. Using a buttress, the safety factor increased to a minimum value of 1.695. Using the buttress and the slope cut modification recommended by the DOI, the safety factor would be increased beyond 1.7.

The bottom line result is that the Jackpile highwall has a minimum safety factor in excess of 1.5, as it now stands. The buttress originally proposed in the Anaconda 1982 Green Book Plan is not needed for future stability. Further, the slope cut modification proposed by the DOI in the draft EIS is not needed to maintain long-term stability. It should be noted that the methods used by Seegmiller International to establish the safety factor are far superior to the methods used by the DOI in the draft EIS.

The Modified Janbu and Modified Bishop methods form the computer program STABL, produced in the late 1970's at Purdue University. The STABL program is widely accepted by regulatory authorities and state agencies. In early August, 1985, many state highway departments, including New Mexico, Colorado, Arizona and California, were using the STABL program. In Utah, the Department of Oil, Gas and Mining uses the program to evaluate mining-related stability projects. The DOI uses the Morgenstern-Price program for all of their stability analyses in the draft EIS. No other government agency, apart from the DOI, uses the Morgenstern-Price program.

Comparative analyses performed by Seegmiller International show the Hoek method to be the most conservative followed by the STABL methods, Modified Janbu and Modified Bishop. The Morgenstern-Price method is the least conservative and tends to produce the highest safety factors of the four methods.

Second, the North Paguate and South Paguate highwalls are and will remain stable if the no-action alternative is adopted. Furthermore, if the water storage reservoir proposed in Anaconda's 1985 Multiple Land Use Reclamation Plan is built in the North Paguate Pit, the North Paguate highwall will remain stable. More than 3,000 individual stability analyses were conducted by Seegmiller International in July, 1985, along cross sections through the North Paguate highwalls under both dry and water storage conditions. The minimum safety factor was found to be in excess of 1.9. These highwalls should remain stable over the long term with no modifications.

All of the Jackpile-Paguate highwalls should present no more of a hazard than natural cliffs in the general mine area. Rockfall events occur along all natural cliffs, and the mine highwalls are not expected to present any significant danger or cause adverse impacts to the adjacent terrain.

The analysis of waste dump stability contained in the draft EIS is based on a completely inaccurate assumption that none of the dumps should be considered to have cohesive strength. It concluded that the waste dumps would have as little cohesion as a sand dune. Such a wholly erroneous assumption is rebutted by the fact that rock and soil tends to consolidate over time under atmospheric moisture conditions.

As rock and soil are consolidated, the density increases as does the cohesive strength. Examples of such strength increase include elevated freeway construction on fill. The fill is left to stand for periods of 12 to

24 months to consolidate and strengthen prior to placing actual pavement. If the fill actually decreased in strength over time, slope failure along freeways would be commonplace.

Such failures are essentially unknown. The fact is that the freeway fill increases in strength and becomes more resistive to slope failure in the long term. Therefore, the DOI has no basis whatsoever in concluding that there's no cohesion in the waste dumps. Cohesion must be included in any stability analysis to make that analysis accurate.

The waste dumps were reevaluated for stability in 1985 assuming the dump slope angles would be described in the Anaconda 1985 Multiple Land Use Reclamation Plan. Those analyses showed that all dumps, except the FD-2 dump, will have safety factors of approximately 1.5 or greater.

The situation in the FD-2 dump is different from any other dump. It was originally placed on a sloping side hill, and, in the past several years, has had a failure. The actual path of the failure plane is difficult to determine, but is believed to follow a path of least resistance along the base of the dump or in the in-place hillside materials. When the DOI evaluated this dump in the draft EIS, they did not even know that total dump rotational shear failure had occurred. The DOI indicated that possibly some foundation spreading may have occurred in the toe, but that was all. The point to emphasize is that a dump failure occurred, but was not recognized by the DOI experts. In other words, dump failure may occur, but may not even be known to occur because essentially nothing is noticed by most people and nothing is impacted.

The present situation in the FD-2 dump is that it has an estimated safety factor of only about 1.05 to 1.1. Only major water infiltration or an earthquake, both of which are extremely remote under the site circumstances, could cause further dump instability. Even if the FD-2 dump further failed, it would only impact a zone 50 to 100 feet below its present toe. Nothing except the natural topography is located immediately below the present toe.

In conclusion, the analyses of highwall and waste dump stability contained in the draft EIS are erroneous and should be corrected. The far more extensive and sophisticated analyses prepared by Seegmiller International provide a much more accurate picture of the actual impacts of the various reclamation alternatives. Our analyses show that no modification of the highwalls is necessary and that the waste dump modifications proposed by Anaconda are more than adequate to assure their stability. Thank you. I would now like to introduce Dr. Ken Ludeke of Ludeke Corporation, and he will testify on revegetation.

MR. RAMPTON: Thank you, Mr. Seegmiller. Before we hear from Dr. Ludeke, we'll take a ten-minute recess primarily for the benefit of the reporter. She has to change paper, plus she's been the only one here really working.
(Recess taken)

MR. RAMPTON: For the record, I might say that I'll correct or amend that last remark. I know that everyone here is working. I meant physical labor on the part of the reporter.

This hearing will come to order. Dr. Ludeke.

DR. LUDEKE: Good afternoon, ladies and gentlemen, panel. My name is Kenneth Ludeke, and I'm president of Ludeke Corporation, an environmental consulting firm that deals mainly with the coordination of environmental permitting for major industrial organizations.

I received a Ph.D. in 1976 with a major in agronomy and plant genetics, a master's of science degree in agronomy in 1973 and a bachelor's of science degree in agronomy in 1968 all from the University of Arizona. My research focused on the agronomic applications in the stabilization of copper mine disposal slopes, reclamation of disturbed areas, and chemical and physical investigations of industrial soil wastes.

I've been directly involved in the methodology of applied research supporting rangeland revegetation planning and soil stabilization for Anaconda's Jackpile-Paguate Mine near Grants, New Mexico.

The revegetation practices and techniques proposed in Anaconda's 1985 Multiple Land Use Reclamation Plan are based upon the successful results of the revegetation program already completed at the mine and practices which have been proven successful in similar projects in the southwestern United States. These reclamation techniques have been derived from my recommendations and the professional recommendations of other consultants and government agencies relative to rangeland revegetation, planning and soil stabilization and the experience of Anaconda's own reclamation team.

In order to promote optimum vegetal germination and growth and allow for efficient rangeland use, land forms will be graded to more gentle slopes and topdressed with a suitable topsoil for enhanced plant growth. The disturbed waste piles and backfill will be conditioned by topsoiling with a minimum of 12 inches of topsoil-like material. The growth media consists of Tres Hermanos Sandstone or alluvial material that has tested suitable for plants from chemical and physical laboratory evaluations.

The Tres Hermanos Sandstone has also been proven an excellent soil for plant growth material from data collected from actual successful vegetation stands. The topsoil material has been stockpiled for future topdressing usage. Following placement of the topsoil, the seedbed is prepared by discing or land imprinting and fertilized.

Anaconda has selected plant species, seeding rates and seed ratios that will more than adequately satisfy the revegetation goals. The plant characteristics selected for were drought tolerance, season of growth, temperature tolerance, salinity tolerance, soil texture adaptation, vigor, reproductive capability, rate of establishment, longevity and mixture compatibility.

The stabilization aspect of the selected plant species provide root systems that offer excellent soil binding properties and also substantial plant canopy that protects the reclaimed ground surface from raindrop impact that dislodge soil particles. The seed mixture contains plants that will establish a balanced vegetal community for both grazing and browsing animals.

The majority of the grasses and all of the shrub species are native to the mine area. These species are well-suited to revegetation at the mine due to

their inherent ability to survive and propagate under the specific climate and edaphic stresses of the area. Seeding will be accomplished by drilling methods. Where seed is broadcast into the areas inaccessible by drills, the application rates will be doubled. All seeded areas will be mulched to aid in plant establishment and to minimize erosion.

Anaconda's previously revegetated area encompasses 17 waste dumps totalling approximately 485 acres. The plant communities evaluated on the reclaimed waste piles are in various stages of vegetation development. The monitoring data collected on reclaimed piles at the Jackpile-Paguate Mine indicates that the vast majority of the reclaimed sites have equaled or exceeded 70 percent of the plant cover and density found on control or reference sites on nearby rangeland after three growing seasons. The monitoring data also shows that these reclaimed sites achieve 85 to 90 percent of the plant cover and density found on reference areas within four to five growing seasons following seeding.

Those reclaimed areas that have not progressed in an adequate manner or not achieved the 70-percent comparative value have received remedial action to improve plant development. When remedial action is taken as soon as problems are identified, the reclaimed areas progress to the 70-percent comparison point within several growing seasons, should precipitation be adequate. The remedial action may include reseeding, additional cultural treatments or retopsoiling.

I have personally inspected Anaconda's reclaimed areas and have conducted ocular plant cover and production estimates and observed plant development. The vegetal communities seeded by Anaconda can withstand the harsh environmental conditions and have displayed a positive direction of change by increased cover and herbage production of grasses, shrubs and forbs. The cover and density of the revegetated areas are successful and within the character of nearby similar rangeplant communities. In fact, many of the revegetated sites exceed canopy cover and biomass found on natural rangeland in the area. The plant individuals on the reclaimed areas possess healthy root material, excellent plant height, leaf size and seed stalk reproduction.

Plant cover and density trend curves assembled from success evaluation data collected on the reclaimed areas clearly indicate that sites achieving 70 percent of reference areas have not experienced retrogression over time. Visual examination of these reclaimed areas explicitly verifies this finding. Soils are stabilized. Reducing water and wind erosion and ecological cycling of nutrients appears to be in progress.

The 70-percent point of success comparison on reclaimed sites to undisturbed rangeland is a subclimax stage in the plant successional complex. This stage is characterized by perennial grasses with some perennial forbs and shrubs with few annual forbs present. This point is generally achieved in three growing seasons at the Jackpile Mine. Sites reclaimed with four or more years since seeding appear to be at a stage near climax with more dense stands of deep-rooted grasses and shrubs, but not many forbs species present. The near climax areas have progressed past the 70-percent comparison point.

Gradually, over a long period of time, soil fertility will improve and support a large number of plant species increasing past the 70-percent subclimax stage of succession to a more stable climax-type vegetation. Once the disturbed areas are at 70-percent or more stage of vegetation development, they should not require further treatment, as the vegetation will increase in density, there will be improving soil fertility, and there will be more soil microorganisms present in the soil to aid and enhance further plant community proliferation.

The collected data and my observations reflect excellent vegetal cover and plant production, plant stand densities and overall stable plant communities where the 70-percent stage is reached. Plant communities attaining the 70-percent comparability value are stable and will progress to higher stages of plant succession over time, assuming the environmental conditions typical of the Jackpile-Paguete area.

Now, it's my pleasure to introduce Warren Keammerer from Boulder, Colorado.

MR. RAMPTON: Thank you, Dr. Ludeke. Dr. Keammerer.

DR. KEAMMERER: Good afternoon. My name is Warren Keammerer. I have a bachelor of science in biology and Ph.D. in botany and plant ecology. For the past 13 years, I have been working as a consultant in vegetation science and plant ecology. Specifically, my work consists of design and evaluation of reclamation plans, evaluation of revegetation success on mined lands and collection of baseline data for use in preparation of mining permits and impacts statements.

I am currently working as a consultant to Anaconda Minerals with the specific tasks of reviewing and redesigning portions of Anaconda's revegetation plan, evaluating monitoring programs and proposals and evaluating certain aspects of post-mining land use capabilities. After having read and evaluated the draft EIS, I have the following comments.

First, I would like to discuss revegetation success criteria. The three proposals in the draft EIS contain three apparently different standards for evaluating revegetation station success. The Anaconda proposal sets the standard at obtaining 70-percent of the cover and production of the surrounding native vegetation, evaluated after three growing seasons. The Department of the Interior proposal sets the standard at obtaining 90-percent of the surrounding native vegetation after 5 years, and the Laguna Pueblo proposal sets the standard at obtaining 90-percent of the surrounding vegetation within 10 years.

On first examination, these standards appear to be quite different. In actuality, the standards are really quite similar because they represent various points on a successful revegetation trend curve.

In most cases, a 70-percent level after 3 years is indicative of successful establishment. Of the 9 different groups of areas, 17 dump sites, that have been reclaimed on the Jackpile-Paguete site, 6 have exceeded 70-percent of the surrounding vegetation. Of the 6, 4 have exceeded 85 percent and, of those, 3 have exceeded 90 percent. Of the 3 that had not exceeded 70-percent when the evaluation program ended, 2 were showing strong positive trends. Only one of

the 9 areas was not -- excuse me -- only one of the 9 areas was not doing well, and the fact that it was not doing well was clearly apparent prior to the end of the third growing season.

The reclaimed areas will be monitored throughout the entire reclamation process, and remedial action will be taken as early as possible to assure revegetation success. If the 70-percent level is reached after 3 years, then, with continued plant community development, it is likely that cover and production will attain 90-percent levels over time. The 3-year/70-percent, 5-year/90-percent and 10-year/90-percent standards represent points on curves of revegetation success. On very successful sites, the 90-percent level may be reached by the third year. On other sites that are successful, the 90-percent level may not be reached until year 5 or later.

Another important aspect of the 3/5-year criterion is that most of the reclaimed areas will be older than three years when the formal evaluation is prepared. Some of these areas will be as much as 10 years old. Evaluation of these older areas will provide data for and insight into the changes in cover and production that occur as the reclaimed areas become older.

In terms of establishing an acceptable standard for revegetation success, the 70-percent level is adequate. Second, I'd like to discuss the use of the community structure analysis method for evaluation of revegetation success. One of the key factors associated with evaluation of reclamation of the Jackpile-Paguate site is the selection of revegetation evaluation methods and identification of monitoring parameters.

The 1985 Anaconda proposal states that canopy cover and total production will be used as evaluation parameters and that that data will be collected using established methods. The Department of the Interior and Laguna Pueblo proposals call for use of an approach called the Community Structure Analysis, CSA, method.

The use of the CSA method is based on repeated sampling of the same transects located on the rangelands in the southwest. Changes in importance value for species encountered on these rangeland sites are then attributed to changes in range condition, since the premise is that the importance value is relatively unaffected by changes in environmental factors such as precipitation. It's of interest to note that the CSA method has apparently been used only on native vegetation. This is important, since these native communities have had hundreds, even thousands of years in which to attain high levels of internal stability.

While the use of the CSA method for evaluating the condition of native rangelands may be a valid, useful technique, it does not appear to be appropriate for use at the Jackpile-Paguate site.

The CSA approach was developed for use on established rangelands where changes in community structure and composition may be related to grazing influences. On the reclaimed areas on the Jackpile-Paguate site, vegetation changes may be related to a variety of factors. It's important to remember that the communities developing on the Jackpile-Paguate reclaimed areas will be undergoing successional changes that will continue until stable communities

develop. During this time, importance values are likely to change dramatically in response to a variety of environmental factors. Because of the differences between the native vegetation and the reclaimed areas, there is no certainty that importance values from the reclaimed areas will respond in the same way as the importance values from native vegetation types.

Additionally, in the publications regarding the CSA method, there is nothing to suggest that importance value is a better indicator of revegetation than are canopy cover or biomass production. In fact, canopy cover and total production are two of the most important factors used in evaluation of revegetation success on reclaimed coal lands.

Third, I'd like to discuss livestock carrying capacity on reclaimed areas. One of the important concerns of any reclamation project is determining whether the revegetation plan will support the defined post-mining land use. At the Jackpile-Paguate site, the reclaimed areas will be used for grazing by domestic livestock and will also provide wildlife habitat.

The projected livestock carrying capacities for reclaimed and native areas were evaluated based on productivity data from several reclaimed dumps in 1981. Assuming 40-percent utilization by domestic livestock, the reclaimed areas would have a carrying capacity of 17 animal unit months per month. This is equivalent to 3.1 acres per AUM. The native areas would have a carrying capacity of 15.6 animal unit months per month, and this equivalent to 3.4 acres per AUM.

It is interesting to note that the projected total carrying capacity of the reclaimed areas is greater than that for the native areas. The analyses of carrying capacity suggest that with existing revegetation technology, the Jackpile-Paguate site can be reclaimed to a level that will support the defined post-mining land use.

Fourth, I'd like to discuss the phreatophytes to control groundwater levels. The 1985 Multiple Land Use Plan proposes to backfill to eight feet above the steady state pond water levels in the pits under reclaimed conditions. These backfilled areas will then be planted with phreatophytic species, like salt cedar. The total consumptive use by the phreatophytes will be great enough to dissipate ground and surface water that will come into the pit. Consuming this much water would require planting 6.4 acres of phreatophytes in the backfilled bottom of the Jackpile Pit and 9.6 acres in the South Paguate Pit.

Since the pit bottoms constitute the lowest point in a closed basin drainage system, there is a potential for salts to accumulate in the long term. If the total salt concentrations in the groundwater exceed 10,000 parts per million, there is potential for the stands of salt cedar to have reduced transpiration rates. If this should occur, there is a potential that limited areas of unproductive vegetation may develop. In terms of the total extent of reclaimed areas, the unproductive areas would represent a very small percent of the total.

Finally, I'd like to comment on the no-action alternative compared with Anaconda's 1985 Multiple Land Use Plan. With Anaconda's 1985 proposal,

grading, backfilling and topsoiling of the disturbed areas would produce suitable sites for plant growth and development. The data from areas that have already been reclaimed using the techniques proposed in Anaconda's 1985 reclamation plan show that plant communities can be created that have cover and production values comparable to the surrounding native vegetation.

The composition of the reclaimed areas consists of species that are desirable for livestock grazing and are supportive of the proposed post-reclamation land use. With the Anaconda proposal, the level of reclamation and effort far exceeds that of the no-action alternative by greatly reducing erosion, maximizing grazing potential, providing wildlife habitat and improving the esthetics of the area. The 1985 plan's projected success is similar to that which can be expected with either the DOI or Laguna Pueblo proposals.

In summary, I'd like to emphasize that 70-percent of the surrounding vegetation cover and production is an adequate standard for assuring that disturbed areas have adequately been reclaimed. Also, cover and production data should be used to evaluate the revegetation success rather than using an untested method like the Community Structure Analysis method. I would also like to state that Anaconda's 1985 Multiple Land Use Plan represents an ecologically reasonable approach to the reclamation of the Jackpile-Paguate site.

The next speaker will be Mr. Larry Murdock from Dames and Moore, and he'll be speaking on the hydrological aspects of the reclamation plan.

MR. RAMPTON: Thank you, Dr. Keammerer. Mr. Murdock.

MR. MURDOCK: Good afternoon. I am Larry Murdock, a partner with Dames and Moore, consultants in the environmental and applied earth sciences. I have a degree in civil engineering from the University of Utah and have over 25 years experience in geotechnical engineering and groundwater studies. I am a registered professional engineer in New Mexico and six other states. I have directed several detailed studies of the hydrology of the Jackpile-Paguate Mine site aimed at determining the long-term groundwater levels below the pits, the degree of ponding which may occur in the pits, and water quality impacts of Anaconda's 1985 Multiple Land Use Reclamation Plan. We have also reviewed erosion control aspects of Anaconda's proposed plan. This work was performed primarily by me and four other members of my staff.

Today, I will address the hydrologic impacts that will occur under Anaconda's plan as compared to other alternatives in the following areas: Long-term groundwater levels, discharge rates of ground water to pit bottom areas, the ground and surface water losses by evapotranspiration and evaporation, the potential for ponding of ground and surface water in the pit bottoms, potential salinity buildup on pit bottom areas due to ground and surface water inflow, groundwater quality impacts, water quality impacts on the Rio Paguate and erosion potential.

Our studies have been extensive and have included field work, laboratory testing of both soils and water, engineering and environmental evaluations and computer modeling of groundwater and surface water flows in the mine

vicinity. I have elaborated on these in my written statement which was submitted with Anaconda's preliminary comments on the draft EIS. A copy of Dames & Moore's final reports will be provided to DOI prior to the close of the public comment period.

The Jackpile-Paguate open pit and underground mines intercept a sequence of low permeability shales and sandstones. The Jackpile Sandstone, the most significant aquifer intercepted by the mine is actually low in permeability; that is, it is capable of very low, small yields. Groundwater in the Jackpile Sandstone flows from recharge areas north and northwest of the mine and, under natural conditions, discharges to the sandstone outcrops or to the alluvium along the Rio Paguate and Rio Moquino in the vicinity of the mine. We have estimated that 23 gallons per minute flowed from the Jackpile Sandstone to the outcrop and alluvium along the Rio Paguate-Rio Moquino in the mine vicinity under pre-mining natural conditions. Some of this flow was lost by evapotranspiration, and some of it contributed to flow in the streams.

At present, groundwater in the Jackpile Sandstone flows into three open pits where it ponds and evaporates. We believe that in addition to groundwater from the Jackpile Sandstone, some water from the Rio Paguate seeps through backfill into the North Paguate open pit at present. Pondered water in the open pits also is due in part to runoff following rains and snow melt. Runoff in the present unclaimed condition of the mine is much higher than will occur following reclamation under Anaconda's plan since vegetation and moisture conservation terracing will reduce runoff, promote vegetative uptake of water, as well as reduce erosion.

Now, under the conditions of Anaconda's Multiple Use Reclamation Plan, we estimate that an average of 4 gallons per minute of groundwater will discharge to the bottom area of the Jackpile pit and 11 gallons per minute will discharge to the bottom of the South Paguate Pit. Phreatophytes and other vegetation will be capable of taking up and transpiring this volume of groundwater inflow. In addition to groundwater, runoff will occur following large precipitation events. Anaconda's plan calls for water-spreading berms or moisture conservation terraces to be constructed over large portions of the presently unreclaimed pit areas. These will be designed to retain a 100-year precipitation event. Thus, in the short term, no ponding of groundwater and occasional ponding of surface runoff is expected in the pit bottoms.

In the long term, a salinity buildup in the groundwater at the bottom of the Jackpile and South Paguate Pits will occur since there will be no outflow other than evaporation. While the ponded areas will eventually no longer support phreatophytes, phreatophytes or similar vegetation will continue to surround the pond areas. While the ponded areas will eventually no longer support -- excuse me.

With the loss of phreatophytes, groundwater and surface water runoff will form ponds which we estimate will occupy an average of five-and-a-half acres in the Jackpile Pit and eight acres in the South Paguate Pit. These ponds will contain unusable water, and, thus, some 15 acres of land will eventually be lost to productive use.

Fifteen acres is a relatively small amount of land, only about one percent of the internally-drained areas and represents some five animal unit months

after grazing. This is less than the amount of land necessary to support one head of cattle.

One advantage to these ponds is that salt, which builds up in long term in the Jackpile and South Paguate ponds due to inflow from runoff and from groundwater which has leached backfill, will not flow, and contribute to the salinity of the Rio Paguate as would be the case with options that restore natural groundwater flow to the river system.

Of course, there will be no ephemeral ponding or salt buildup in the North Paguate Pit because the Rio Paguate is planned to be diverted through the pit, and stream outflow will be established. At the present time, there is some 50 to 100 acre feet per year of seepage into the west side of the North Paguate Pit from the backfill from the river alluvium. With filling of a reservoir in the pit, this seepage rate would be reduced to approximately 10 acre feet per year due to reduction in head differential. About the same rate of groundwater flow would occur out of the east side of the pit.

Development of the water storage reservoir in the North Paguate Pit will provide a significant stockwatering and irrigation resource. We expect that water quality of the reservoir will achieve a total dissolved solids concentration of approximately 1,000 parts per million within five years of filling, and this will be reduced to approximately 900 parts per million eventually. This should be suitable for most irrigation and stockwatering uses. Thus, this reservoir can provide an important storage, stockwatering and recreational uses.

With regard to erosion protection, Anaconda's plan for erosion control includes regrading three horizontal to one vertical slopes on dumps having potential to contribute significant sediment to the Rio Paguate, contour furrowing or land imprinting, construction of moisture conservation terraces and revegetation. These procedures are based upon sound erosion and sediment-control practices and should mitigate most environmental impacts associated with erosion, sedimentation and runoff.

Let me now compare these impacts and achievements to other alternatives. Under the no-action alternative, groundwater levels and groundwater discharge rates to the pit bottom areas would be about the same as they are now. Ponds would increase to an average extent of some 65 acres and would be unsuitable for irrigation and stockwatering due to high salinity. The amount of surface water runoff and groundwater discharge lost to the Rio Paguate system would be about 91 acre-feet, equivalent to about 8 percent of the present mean flow of the Rio Paguate. While salts would build up in ponds in the pits, the potential for salts leached from backfill to run into the Rio Paguate would be small since groundwater and surface runoff would be retained in the pit areas.

Under the no-action alternative, erosion and sedimentation in the effective area may continue at a reduced rate as volunteer vegetation becomes established. There would be continued flood-induced erosion on the waste dumps located within the flood plains of the Rio Paguate and Moquino and other ephemeral channels. Existing protore piles and waste dumps have potential for erosion due to overland flow. This erosion would continue and result in increased sediment loads in streams. In short, the no-action alternative

would allow continued adverse environmental impacts although none of these impacts would endanger human health.

The Department of the Interior has proposed two options, a monitor option and a drainage option. With few exceptions, waste dump slopes under these plans would be flattened to three horizontal to one vertical with no terracing. These designs are very similar to that proposed in the 1985 Multiple Land Use Plan. While groundwater would not pond under the monitor plan, temporary ponding of the surface water runoff is inevitable and some salt buildup due to solar evaporation would be expected. Poned runoff which seeps into the subsurface would recharge groundwater, but would also leach salts from the backfill. Eventually, soluble salts would discharge to the Rio Paguete through natural groundwater flow.

Under the drainage option, the pit areas will be contoured and channeled to allow external drainage. Overland flow along the externally draining catchments will generate additional sediment which will result in increased sediment loads in the streams, recharge to groundwater, and, thus, potential leaching of backfill would be less than under the monitor plan since no ponding would occur. However, salts which leach from backfill following restoration of natural ground water levels would eventually discharge to the Rio Paguete.

Concerning the potential for erosion and sedimentation inputs on streams, the Laguna proposal is nearly identical to the Department of Interior's Monitor Plan. Hydrologic effects would also be quite similar to the Department of Interior monitor plan.

In summary, we have performed extensive studies to evaluate the surface water, groundwater and erosional impacts of Anaconda's 1985 Multiple Land Use Plan. The results of our studies, which we feel are conservative, indicate that in the short term, that is, in the first 10 to 40 years, there will be no ponding of groundwater in the pits because phreatophytes will evapotranspire this water. There will be occasional ponding in the pits from surface runoff. The planned water spreading berms will reduce the amount of this surface water ponding.

Over the long term, salts will build up in the ponded area due to evaporation. This will eventually lead to a permanent salty pond covering a total of about 15 acres. This is less than the amount of land necessary to support a single head of cattle.

We feel the planned North Paguete Pit reservoir represents the best reclamation plan for this area. It will provide for irrigation storage, livestock watering and possibly fishing and other recreational uses.

The proposed grading plan, in our opinion, provides a reasonable approach to mitigation of erosion potential. It will substantially reduce impacts from erosion, sediment transport and surface water flow on the Rio Paguete and Rio Moquino drainages. It will also reduce salt flow into those streams which will result in an improvement in their quality. The proposed plan will have no adverse impact on human health. Thank you.

I'd now like to introduce Mr. Gordon Toll of the Anaconda Company who will make a closing statement.

MR. RAMPTON: Thank you, Mr. Murdock. Mr. Toll.

MR. TOLL: Gentlemen of the panel, ladies and gentlemen, good afternoon. My name is Gordon Toll. I'm employed by the Anaconda Minerals Company, and New Mexico operations currently report to me. I'd like to make a few concluding remarks on behalf of Anaconda Minerals.

First, I'd like to emphasize that Anaconda believes the Draft Environmental Impact Statement is inadequate. We request that it be withdrawn, that it be substantially rewritten to incorporate the information provided by Anaconda and that it analyze a complete range of alternatives. The revised draft should then be republished to allow public comment. Otherwise, the draft EIS will not perform the intended function of soliciting public comment based on a realistic assessment of the environmental impacts of a full spectrum of reclamation alternatives.

Second, I would like to strongly underscore Anaconda's commitment to perform responsible reclamation of the Jackpile-Paguate Mine site. The 1985 Multiple Land Use Reclamation Plan fulfills that commitment. It is an innovative and cost-effective approach to reclamation that will provide for multiple uses of the mine site. These uses include grazing, water resource development for possible livestock watering or irrigation use, or fish and wildlife habitat. Also includes recreational activities and provides for future mining of potentially valuable mineralization. It not only will protect the resources in the area of the mine site, it will enhance them.

The 1985 Multiple Land Use Reclamation Plan far surpasses Anaconda's minimum legal obligations. Those obligations might well be satisfied by no-action at all or, at most, a minimal reclamation plan costing less than \$3.8 million.

Instead, Anaconda has spent years of time of its technical personnel and consultants as well as millions of dollars to secure the best available information on environmental conditions at the mine site and to design a state-of-the-art reclamation plan. Although it goes far beyond our obligations, we offer this 1985 Multiple Land Use Reclamation Plan in order to maintain our valued relationship with the Pueblo of Laguna, to preserve our reputation as responsible corporate citizens and to encourage the prompt agreement among all parties on a sound reclamation plan. We respectfully request timely approval of this plan and stand ready to implement it as soon as it is approved. Thank you.

MR. RAMPTON: Thank you, Mr. Toll. This concludes the presentation by Anaconda, but we have one other gentleman who wants to comment. He represents the American Mining Congress. I'd like to have his statement more for continuity before we hear from representatives of the Pueblo of Laguna. Mr. Beverly. After his presentation, we'll hear from Governor Fernando.

MR. BEVERLY: Mr. Chairman, members of BLM, members of the public. My name is Bob Beverly. I'm Director of Environmental Affairs for UMETCO Mineral Corporation, a fully-owned subsidiary of Union Carbide. By way of a background, I've been in the uranium industry 31 years, 28 which have been

involved in the radiation and inspection of the uranium mining and milling. I'm also chairman of the American Mining Congress Uranium Environmental Subcommittee, and it is on behalf of the AMC that I appear today.

The American Mining Congress represents mining and minerals processing companies, as well as manufacturers and financial institutions that serve the mining industry. AMC's member companies produce a substantial portion of the nation's uranium, coal, metals, and agricultural minerals. The Uranium Environmental Subcommittee is a working committee composed of representatives of AMC's, uranium producing members. Our subcommittee has represented the uranium industry in important rulemaking proceedings before the EPA and the NRC on the regulation of the radon emissions from underground mines and uranium mill tailings.

The primary concern of AMC in this proceeding, and the reason why we appear with these brief remarks, is the potential reclamation precedent that would be established for other uranium mining operations here in New Mexico and elsewhere in the western United States.

At the outset, AMC fully supports the position taken by Anaconda Minerals Company in its preliminary comments on the Draft Environmental Impact Statement for the Jackpile-Paguate Uranium Mine Reclamation Project and in its testimony before you today. In particular, AMC agrees, the Department of Interior does not have unlimited discretion to impose any reclamation requirements, but primarily only such authority as provided in its lease with that company.

The draft EIS significantly overestimates the radiological risks associated with the mine and wrongfully disregards the no-action alternative based on these overestimates. The draft EIS fails to properly consider the full range of alternatives as required by the NEPA process. The draft EIS contains numerous analytical and factual errors in the description of alternatives and the affected environment, and the draft EIS is not an effective decision-making tool as it fails to provide a meaningful cost benefit analysis on the various elements in each alternative.

The grounds stated by Anaconda in its preliminary comments, especially in the statements of its experts, fully justify these conclusions. As we have adopted these comments, further elaboration is, we believe, unnecessary except on two points. I want to address only those two points.

First, the draft EIS should make a greater effort to place the potential risks of radiation exposures from this mining operation in proper perspective. When the department does so, it will conclude, we believe, that the radiation risks are so insignificant that they should be only an incidental consideration in any reclamation plan for this mine.

Key considerations regarding this are. Although risks can be calculated based on the linear no-threshold model down to zero radiation exposures, this is not to say that a hazard is present. Whether a hazard exists depends upon the dose to which each individual is exposed. As fully established in a recent report prepared by SENES Consultants Limited for AMC -- and I'm going to present a copy for the record. I don't know who's going to carry it where,

but this is quite a compilation. AMC sponsored probably the best information we think available today on the effective dose as it regards the uranium miners.

MR. RAMPTON: We'll mark that Exhibit 1, and it will accompany the transcript as an exhibit.

MR. BEVERLY: Thank you. Human epidemiological data, as demonstrated in the report, show no lung cancer incidence among the underground uranium miners exposed to radon at below 100 cumulative working level months exposure. It is highly unlikely if any individual member of the public would be exposed anywhere near this level due to radon or particulate emissions from the Jackpile Mine.

Moreover, in examining the radiation risks from this mine, it must be remembered that the radiation associated with it is natural to the environment. Radon, which is the principal radionuclide of concern in the draft EIS, occurs naturally in the atmosphere, as it is emitted in variable quantities from the soil and other natural sources. As recognized by NRC, the radon contribution to the atmosphere from the entire uranium mining and milling industry in this country is not more than three-tenths of one percent, and the radon dose to the U.S. population from our industry is less than one-tenth percent.

This is best illustrated -- I have only one set of color prints, whoever wants that. But in this pie chart, you can see the blue area surrounding figures represents 91-percent of the radon emitted in the United States, and that's from natural soils. The red-crossed entry is from evapotranspiration, which amounts to 7-percent. Soil tilling, the plowing of soils, amounts to 2.3 percent and uranium mining and milling, as I mentioned, three-tenths of one percent, and other sources one-tenth of a percent. The more important thing is the dose relationship, and we have a pie chart on this, also.

The blue area represents some 55-percent of the dose to the people in the United States from radon comes from building interiors, the things we build buildings out of. 40-percent comes from the natural soils, largely what's underneath the homes and buildings in which we live and work; 3-percent from evapotranspiration; soil tilling, 1-percent; natural gas that we use for cooking, 1-percent; and all other sources three-tenths percent including one-tenth of one percent from uranium mining and milling. So I think we have to realize that radon is all around us right here in the building today. Whoever wants to fight over the color charts --

MR. RAMPTON: We'll mark those as official exhibits, also, 2 and 3, after your presentation.

MR. BEVERLY: Obviously, the considerations of the Jackpile-Paguate Mine is but an infinitesimal fraction of these already small industry-wide numbers. Certainly, the risks, calculated for emission from this mine, must be considered insignificant when compared to the other sources.

Finally, on this first point, the significance of the potential radiation dose from this source should be determined by comparing the incremental increase in risks to the risks resulting from exposure to natural background.

Again, when so examined, you will find that the incremental increased risk from this mine is an insignificant increase in background risks a very short distance from the mine.

The second point that I would like to mention, we would like to emphasize the importance of cost benefit analysis in examining the various alternatives of radiation risk reductions are to be considered in developing the reclamation plan for this mine. In dealing with any pollutant for which a no-effects threshold is assumed, as is in the case with radiation, it is imperative that the costs of risk reductions be examined on an incremental basis. Ultimately, the cost to be imposed should be reasonably related in terms to the risk reduction to be achieved.

EPA itself has recognized this important consideration in its proceedings to establish radiation protection standards for the nuclear fuel cycle operation. In these proceedings, EPA stated themselves that it cannot and should not set radiation protection standards without such consideration for two reasons: 1, because it is prudent to assume that there is no threshold level for radiation effects in setting standards; that is, risk is proportional to dose all the way down to zero, and since there is, in this theory, no safe level, there is no logical way to set radiation standards other than to balance the risks against the costs of control.

Secondly, the EPA pointed out that you have to do this because the nuclear industry is too important to the nation's future power supply to ignore cost and technology considerations. We agree this is the only rational approach to establishing radiation regulations, and it should be implemented by the Department of the Interior.

In conclusion, we recognize that there is some public perception that equates any level of radiation exposure -- no matter how small -- with a cancer hazard. We also recognize that some members of the public want risks associated with any potential carcinogen -- including radiation -- to be reduced as near to zero as technologically feasible.

We believe, however, that the government's obligation, including this agency in this hearing, is to educate the public on the realities of risks involved, not to placate misperceptions by imposing costly requirements on industry. For the government to do otherwise is to prevent orderly development in a modern industrial state. Moreover, the public in general must understand that there is a price to be paid for requirements that push the limits of technological feasibility to avert marginal costs -- risks. It is such demands for near absolute safety that has nearly brought the nuclear power industry, including uranium mining and mining in this country, to the brink of premature death.

For the direct consequences of such unreasonable demands, one does not have to look beyond Grants, New Mexico and other uranium mining communities in the western United States to see the shattering effects on the lives of real people. By a comparison, you will never find a real individual member of the public to be adversely affected by radiation from this or any other uranium mine or mill. It's just too infinitesimal a quantity.

In effect, in dealing-with perceptions of hazards and imposing requirements on the edge of feasibility, we are, as a nation, squandering important resources needed to make this country competitive in the world markets and to keep long-term jobs in our local communities. If reclamation requirements for uranium mines and mills are not kept within the bound of reason, it is a fair conclusion that investments necessary for a domestic uranium mining and milling industry will never be made.

I thank you for that opportunity to talk with you today.

MR. RAMPTON: Thank you, Mr. Beverly. Governor Chester T. Fernando.

GOVERNOR FERNANDO: Good afternoon. Gosh, how I waited for this moment. I am Chester T. Fernando, Governor of the Pueblo Laguna. I appreciate the opportunity to appear and express the Pueblo's concerns regarding the reclamation of the Jackpile-Paguate Mine. The pueblo is anxious for Atlantic Richfield Company, normally known as ARCO, through its subsidiary Anaconda Minerals Company, to begin reclamation and fulfill its legal obligations to the pueblo and United States. It is outrageous that there has been no effort since the mine closed in 1982 to even mitigate the most obvious health hazards.

On October 18th, 1951, the Pueblo of Laguna granted the Anaconda Company, now a wholly-owned subsidiary of the Atlantic Richfield Company, an exclusive uranium prospecting permit covering substantial portions of the lands of the Pueblo Laguna. Consistent with the procedure at the time, the permit extended to Anaconda the exclusive option.

During 29 years of operation, over 400 million tons of materials were removed from the three open pits and several underground mines. The ore mined had a value to Anaconda in excess of 600 million on which substantial profits were made. Thousands of members of the pueblo worked for Anaconda during the 29 years of operation, but only about 200 of them have qualified for company pensions, pensions that are inadequate, and most exist at the poverty level with no health insurance. It is unfortunate that Anaconda did not adequately provide for its employees and their families. These people who gave their lives to the mining operation feel abandoned.

This may be beside the point of reclamation, but I, as governor, recognize how they may feel that they were treated unfairly. This is particularly true of the people from Paguate Village which overlooks the mine site serving as a constant reminder of their hard work and Anaconda's failure to clean up the mine site. Upon cessation of mining operations as of March 31st, 1982, Anaconda had three leases with the Pueblo of Laguna in effect. Lease number 1 covered approximately 5.0 thousand acres, dated March 27, 1952, and it was approved on May 7th, 1952. Lease number 4 was dated July 24th, 1963, approved July 30th, 1963, covered approximately 2.6 thousand acres. Lease number 8, dated July 6, 1976, approved July 26th, 1976, covering 320 acres, totaling approximately 7.9 thousand acres.

The Jackpile-Paguate Mine is not only the oldest open pit uranium mine in the world, it is the largest open pit uranium mine in the United States, and it has not been reclaimed. Approximately 50-percent of the residents of the State of New Mexico live within a 50-mile radius of the mine. This includes the Albuquerque metropolitan area and the City of Grants.

The mine straddles the Rio Paguete and Rio Moquino which eventually flows into the Rio Puerco and the Rio Grande River. As can be seen, the environmental effects of the unreclaimed mine touch the lives and properties of a substantial portion of the state's 1.3 million inhabitants. This is why total reclamation satisfactory to the federal government, the pueblo and all affected citizens of the State of New Mexico is essential.

Of the 7,900 acres leased by Anaconda, approximately 2,656 acres have been mined and remain unreclaimed. The mine has unstable highwalls with some pits being over 250 feet deep. The mine area is larger than downtown Albuquerque. This building could be easily buried in only one of the five pits along with the hotel next door and the entire Civic Plaza area. This should assist you in getting a mental picture of how vast this unreclaimed mine is.

Anaconda submitted a reclamation plan to the United States geological survey on September 11, 1980, which was subsequently withdrawn and replaced by the revised plan in March, 1982. The review of the 1980 reclamation plan by USGS led to conclude that the reclamation of the Jackpile-Paguete Mine was a major federal action requiring the preparation of an Environmental Impact Statement, now known as EIS, as prescribed by the National Environmental Policy Act of 1969, NEPA.

The process has continued pursuant to a memorandum of understanding approved May 28th, 1981, between the USGS as the agency responsible for approving all mining and reclamation plans for Indian minerals under the Indian Mineral Leasing Act, and the Bureau of Indian Affairs, which is responsible for administration of surface resources on Indian lands. The BLM has succeeded the USGS as the agency responsible for enforcing reclamation.

On August 16th, 1985, the Anaconda Company withdrew its 1982 reclamation plan and submitted in its stead the 1985 Multiple Land Use Reclamation Plan. Further, the Anaconda Company submitted its preliminary comments on the draft EIS for the Jackpile-Paguete Mine Reclamation Project dated August 16th, 1985. These comments expressed Anaconda Company's legal position with regard to limitations on its reclamation obligations. It is the purpose of these comments to respond to the EIS and Anaconda's position. The legal position of the Pueblo of Laguna with regard to the reclamation obligation of Anaconda will be addressed in more detail by our attorneys at these hearings.

As will be pointed out, the Anaconda Company has legal responsibility under the terms of the mining leases, regulations and statutes as well as the social responsibility to eliminate all health and safety hazards caused by mining operations, return the land to productive land uses and provide for the long-term stability of the mine site so that health and safety hazards do not occur.

Anaconda acknowledged and accepted this responsibility both orally and in writing throughout the many years of mining operations. Anaconda, at the highest level, stated that its 1982 reclamation plan was a responsible and technically defensible plan that would insure adequate -- and I want to emphasize -- adequate reclamation of the mine site. Anaconda is now attempting to withdraw from these responsibilities.

Anaconda over the years has submitted six, six reclamation plans and withdrew five of them. It submitted a report by its consultant that stated that there would be subsidence around the mine and then withdrew that report and submitted another one that stated there would be no subsidence. It submitted a report that stated the highwalls were unstable and then withdrew that report and substituted one that stated the highwalls were stable. Contradictions. It submitted a hydrology report that projected the groundwater recovery level and then withdrew that report and submitted one that projected much lower recovery levels, and its radiological consultant originally stated that four feet of cover was needed for the hazardous material, and now Anaconda states that no cover is needed.

Anaconda entered discussions in 1980, 1982 and 1985 with the Department of the Interior to negotiate the technical issues and the volumes associated with reclamation, but withdrew from these discussions often without providing the information to which they agreed.

Now, after eight years of submitting and withdrawing reclamation plans and consultant reports and four years after the EIS process was begun, Anaconda again has withdrawn its reclamation plan and submitted a new plan. It is obvious that Anaconda is seeking to delay the EIS and decision-making process and is refusing to work within the established regulatory procedures to resolve this issue. In so doing, Anaconda is forcing a substantial portion of the general public and especially the residents of Pagate to be exposed to unacceptably high levels of radiation.

The hazardous materials at the mine continue to be dispersed by wind and water erosion. The unstable highwalls and open underground entries at the unguarded and unfenced mine sites are easily accessible to uninformed members of the public and are a serious public safety hazard. That no one has been seriously injured or killed is a miracle.

Anaconda's latest reclamation plan would turn the mine into a sacrifice area where little or no human activity could ever occur. This plan would not reduce radiation released from the site to acceptable levels. The hazardous materials at the site would be subject to erosion by the two rivers that run through the site and result in a continually expanding area which is unsafe for human use. This new plan, therefore, is not only insufficient, it represents only minimal, temporary reclamation and cannot be considered a serious proposal.

The 1985 plan totally contradicts Anaconda's 1982 plan and its consultants' reports which confirms the necessity of removing the hazardous material from the stream channels, backfilling the open pits to above the groundwater recovery level, stabilizing the highwalls, covering the hazardous material with four feet of shale and stabilizing the mine site. According to Anaconda's 1982 plan, all of these items were required under the terms of its lease and necessary to protect the environment.

In order to effectively reclaim this mine site and provide for its long-term stability, any approved reclamation plan must include the following items: An appropriate level of compensation for blast damage that occurred in the Village of Pagate during mine operations. To substantiate that, I have, for an exhibit and the record, pictures of various houses, housing sites.

MR. RAMPTON: We'll enter that in the record as Exhibit 4.

GOVERNOR FERNANDO: A reduction in the slope of all highwalls, especially the North Paguate highwall, since it's close to the town of Paguate, backfilling the open pits to at least ten feet above the projected groundwater recovery levels and establishing effective procedures for monitoring and raising the level of backfill in the future if the ground water recovers to a level higher than projected; removing contaminated material from the river flood plain, covering all contaminated material with a minimum of four feet of uncontaminated materials and one foot of soil, reduce all slopes to no greater than three to one, decontaminating or removing all buildings and the railroad spur where numerous ore spills have occurred, revegetating the site, providing effective procedures for long-term monitoring and maintenance of the site.

The U.S. Department of the Interior, DOI, has the responsibility under the lease terms and regulations to require that a proper level of reclamation be performed by Anaconda, and the DOI is using the EIS process as mandated by NEPA to assist the decision-makers in determining the proper level of reclamation.

Overall, the DEIS represents a massive effort on the part of the preparers and contributes significantly to the resolution of the many issues and concerns that have been raised on the project. There are, however, a number of areas that require additional effort before the DOI can select a preferred alternative and issue a record of decision.

The Pueblo of Laguna is very concerned that many issues associated directly with health and safety hazards caused by mining operations have been omitted from the DEIS. Among these items are, the siltation and the increase in radiation in the reservoir downstream from the mine site, damage to structures in the Village of Paguate from blasting during the mine operations, returning the mine site to its pre-mining use as farm and rangeland, investigation of the health impacts on members of the pueblo and other mining employees that occurred during mining operations.

These impacts result from the mining operations and represent serious health and safety hazards to members of the pueblo and the public within a 50-mile radius of the mine. They must be described in the EIS and appropriate measures must be included in the approved reclamation plan to mitigate these impacts.

In addition to the above issues which are not mentioned in the DEIS, the DOI has failed to take a firm position on the following issues: Resolving the discrepancy in the projected groundwater recovery levels, providing a mechanism for the long-term maintenance of the mine site and identifying an appropriate design life for the reclamation alternative. The DOI must resolve these issues.

Finally, the DOI has failed to adequately address in the DEIS the land use impacts, air quality impacts during reclamation, costs, revegetation success and the drainage of the reclamation site. Since the process of selecting an appropriate level of reclamation has been delayed, Anaconda should be ordered to perform interim reclamation of the site to reduce the health and safety hazards and to stabilize the site pending the final decision on how the site should be permanently reclaimed.

The pueblo is adamant that the DEIS address the following issues which are of utmost importance to the pueblo: Mining damages to the Village of Paguete. There are cracks and fissures in the walls throughout the village. Some walls are about to fall down. The repairs performed by Anaconda are not adequate. Health hazards. It is an absolute contractual requirement for Anaconda to protect the health of all persons from mine site hazards. The primary concern is cancer and birth defects caused by exposure to radioactive materials and breathing radioactive dust.

Anaconda's 1985 sacrifice plan is inadequate and dangerous. In short, it is so disgraceful that Anaconda should be ashamed to have presented it. The pueblo will not accept any plan which does not adequately address the issues I have discussed with you today.

In summary, I'm surprised that after 30 years of mining and disturbance regarding the open pits, seepage of groundwater from the former mine site, radiological exposure to human, livestock, surrounding lands, transportation of grade ore, various amount of spillage, dangers of radiation, impact on health land and air -- and remember one thing about statistics, Indians always are number one in health ratings. That means we're very poor. With this in mind, I'm surprised that you technical people on behalf of the Anaconda Company can courageously state that only a very minimum of hazards and dangers exist and that only a minimum reclamation is sufficient.

Thank you.

MR. RAMPTON: Thank you, Governor. We're going to take a very short recess, and when we reconvene, I intend to go until 5:30 on this session. We have 12 more signed up to speak, and I don't think we can get all those 12 in, unless they're very short, before 5:30. So if there is anyone who was signed up to speak who cannot appear this evening at the evening session starting at 7:00 o'clock, would they please notify one of the members of the panel.

This hearing is in recess until 4:15 precisely.

(Recess taken)

MR. RAMPTON: The hearing will come to order. Our next speaker will be Les Taylor.

MR. TAYLOR: Judge Rampton, members of the committee. I'm tempted to give you my qualifications as well; but, unfortunately, I don't have many. I've been to two goat ropings and a county fair. I've never been to heaven, but I have been to Oklahoma.

I'm Les Taylor, counsel for the Pueblo of Laguna. I'm with the firm of Nordhaus, Haltom, Taylor and Taradash in Albuquerque, New Mexico. I've been asked to present to you the Pueblo of Laguna's legal position with regard to the legal obligation of the Anaconda Minerals Company to reclaim the Jackpile-Paguete Mine.

Anaconda in its preliminary comments on the DEIS has stated that it has limited reclamation obligations under the prospecting permit and the 1952 and 1963 leases. Today, Anaconda has suggested that perhaps it has no legal obligations whatsoever.

This position is not new, and in fact, the Anaconda Company has, on previous occasions, implied that its contractual reclamation obligation was considerably less than what it proposed in its 1982 reclamation plan. Notably, in a letter dated March 23rd, 1982 from W.C. Norem to Mr. Vincent Little, Area Director, Bureau of Indian Affairs, Anaconda in a letter submitting a bond in the amount of \$45 million stated -- and I'm taking excerpts from that letter -- "Anaconda is entitled, if it should desire, to perform reclamation on the former leases taking full advantage of 30 C.F.R. Section 231.10 (d), which requires a reclamation plan to include reseeding and backfilling, if the lease requires. Note that neither lease 1 nor lease 4 so require this plan. Anaconda is furnishing the bond in the spirit of cooperation and anticipation that its plan will be approved and reclamation can begin within a timely manner. However, once, again, we note that 25 C.F.R. Section 216 specifically provides in 216.2(c) that the regulations are not applicable to Anaconda's former leases 1 and 4.

And finally in that letter, the following language appeared, "In the event Anaconda's plan is not approved, Anaconda reserves the right to have the bond reduced to an amount equal to its legal obligation under the terms of the former leases and applicable regulations. Anaconda also specifically denies the allegations contained in your letter of January 26th, 1983, that the Environmental Impact Statement may require any additional reclamation or that the BIA has any right to reserve authority to increase the bond beyond any authority that may exist pursuant to the former leases 1 and 4 and current lease 8 and applicable regulations".

In fulfillment of its implied threat to revert to what it considers its legal obligation to be with regard to the reclamation project, Anaconda has attempted to withdraw its 1982 reclamation plan and substitute the 1985 Multiple Land Use Reclamation Plan. In so doing, Anaconda arguing that the contractual obligations contained in the lease agreements are limited to Anaconda's conducting operations in accordance with good mining practices and that the lease provisions do not require any reclamation. At best, the company argues, the contractual obligation might require some post-mining activity to leave the mine site in a condition that does not pose any unreasonable hazard to human health or safety.

Anaconda also argues that its obligations under the regulations are limited. It states that the mineral leasing regulations, 25 C.F.R. Part 211 and the reclamation regulations 25 C.F.R. Part 216, of the BIA do not impose any specific reclamation obligations on Anaconda. As to the latter, Anaconda argues that those regulations are only prospective in nature -- that was mentioned again today -- and consequently do not apply to the leased lands. Anaconda ignores the fact that Part 216 superseded regulations which contained basically, if not exactly, the same requirements.

Further, Anaconda argues that the BLM operating regulations 43 C.F.R. Part 3570, prescribed only a general obligation to take steps to prevent injury to life and health. The basis of Anaconda's position is that there are no specific, direct contractual or regulatory reclamation tasks imposed upon the company, and, thus, the 1985 Multiple Land Use Reclamation Plan is more than adequate to comply with Anaconda's legal obligations, and, I think, limited obligations.

I do believe that we should take a look at the contractual obligations of Anaconda. At the time of cessation of mining operations at the Pueblo of Laguna, the Anaconda Company had three existing leases as noted above. Certain of the provisions of these various lease agreements are pertinent to a discussion of Anaconda's contractual obligations.

The lease of March 27, 1952. In Section 3(c) entitled "Diligence, Prevention of Waste," it is stated, "Lessee shall promptly surrender and return the premises upon the termination of this lease to whomsoever shall be lawfully entitled thereto in as good condition as received, except for the ordinary wear and tear and unavoidable accidents and the proper use and changes which may be due to the proper mining and use of the same under this lease."

Section 3(f) of the 1952 lease, under "Regulations," states, "Lessee agrees to abide by and conform to any and all regulations of the Secretary of the Interior now or hereafter in force relative to such leases."

Section 6 of that same lease agreement entitled "Surrender and Termination" states, "The lessee shall have the right to terminate upon a showing satisfactory to the Secretary of the Interior and the lessor that full provision has been made for the conservation and protection of the property."

The lease of July 24th, 1963, contains the following provisions. In Section 3 entitled "Diligence, Prevention of Waste, Lessee agrees to surrender and return promptly the premises upon the termination of this lease to whoever is lawfully entitled thereto, in as good condition as received, except for the ordinary wear and tear and unavoidable accidents and their proper use of the premises; not to remove any building or permanent improvement erected on the leased property during the lease."

Section 7, "Regulations, To abide by and conform to any and all regulations of the Secretary of the Interior now or hereafter in force relative to such leases including 25 C.F.R. Section 171 and 30 C.F.R. Section 231. Rate of royalty, the annual rental or the term of the lease may not be changed by future regulation without the written consent of the parties to this lease."

Section 13 under the title "Surrender and Termination," states, "The lessee may terminate upon a showing satisfactory to the Secretary of Interior or his authorized representative that full provision has been made for the conservation and protection of the property."

Section 16, "Damages," reads as follows: "Upon termination of operations under this lease, the lessee shall make provisions for the conservation, repair and protection of the property and leave all the areas on which the lessee has worked in a condition that will not be hazardous to life or limb and will be to the satisfaction of the superintendent," not to the satisfaction of Anaconda.

The Anaconda Company is setting for its legal position in -- in setting forth its legal position has ignored the existence of the lease agreements entered into in 1952 and 1963 of those provisions relating to the applicability of any and all regulations of the Secretary of Interior now or

hereafter in force. This contractual obligation to comply with regulations seriously deflates the argument set forth by Anaconda in its comments dated August 16th, 1985.

I'd like to discuss with you the applicable federal regulations. The Anaconda Company has correctly pointed out that 25 C.F.R. Part 211 does not contain any specific reclamation obligations. It then argues that 25 C.F.R. Part 216 is not applicable to the Anaconda leases due to the statement in 25 C.F.R. Part 262(c) that these regulations shall be prospective in nature only. Again, the Anaconda company has ignored the specific contractual language requiring it to comply with any and all regulations in force at the time of the agreement or promulgated subsequent to the agreement by the Secretary of Interior. The rather specific reclamation regulations contained in Part 216 are applicable, contractually, to the Anaconda Company.

The relevant lease provisions include the following: Under Section 7 of the 1963 lease, Anaconda agrees, again, "To abide by and conform to any and all regulations of the Secretary of the Interior now or hereafter in force relative to such leases including 25 C.F.R. Section 171 and 30 C.F.R. Section 231." Certain of the lease terms cannot be changed by the Secretary, according to that provision, but it doesn't say anything about reclamation.

Note that 25 C.F.R. Section 171 is now 25 C.F.R. Section 211, and that 30 C.F.R. Section 231 is now incorporated in 43 C.F.R. 3570, et seq. The 1952 lease is virtually identical except for the explicit reference to 25 C.F.R. Part 171 and 30 C.F.R. Part 231. Contrary to Anaconda's position, there can be no doubt concerning the applicability of the provisions contained in the cited regulations. It must be recognized that Part 216 is a regulation of the Secretary of the Interior hereafter in force, relative to such lease and, therefore, must be incorporated in the leases.

Finally, with regard to the National Environmental Policy Act of 1969, the Secretary is inescapably obligated to follow the mandates of NEPA, which is binding on all federal agencies. Indeed, absent specific reclamation regulations for hard rock surface mining, this is the only process available by which the responsible decision-maker can select a reclamation alternative which, in his judgment, is in the best interests of the Pueblo of Laguna. The cases of Davis v. Morton and Cady v. Morton confirmed long ago the applicability of NEPA to Indian lands.

The time has long since passed when arbitrary decisions could be made with regard to actions significantly affecting the human environment. The pueblo submits that this is the legally correct procedure, the EIS process, designed to enable the responsible decision-maker to comply with the mandates of the lease agreements and the regulations in determining the appropriate action to be taken with regard to the reclamation of the Jackpile-Paguate Uranium Mine. It must be acknowledged that nowhere -- not in the leases, the statutes or the regulations -- is it written that Anaconda shall determine what the reclamation effort will be.

MR. RAMPTON: Thank you, Mr. Taylor.

MR. TAYLOR: Thank you.

MR. RAMPTON: Marc Nelson.

MR. NELSON: My name is Marc Nelson, and I am an environmental engineer for Jacobs Engineering. I am here representing the Pueblo of Laguna today.

Anaconda mining operations altered the physical and chemical properties of the rock at the Jackpile mine site by pulverizing and oxydizing the rock. The radioactive elements and other toxic elements which were previously bound in the rock is now being eroded by wind and water erosion and is exposing the general population to unacceptable radiation and toxic ailments.

Most of the 3,000-acre mine site contains concentrations of radioactive elements which are at least 15 times greater than background levels. Portions of the mine site contain levels which are in excess of 100 times background levels, and even smaller portions of the site are over 1,000 times background levels. These levels are far above the level of twice background which Anaconda themselves, as well as the Department of Interior, have said is an acceptable level of radiation. The concentrations of uranium and radium in the Rio Pagate downstream of the mine site is 10 to 40 times greater than the concentration upstream from the mine site.

The mine also contains unstable highwalls and waste dumps, which are in the process of failing, as well as open-vent holes and mine openings, which are serious public safety hazards. The most serious characteristic of the mine site is that these hazards are becoming worse each year.

The area contaminated with radioactive material is continually increasing in size by wind and water erosion. The surface and groundwaters contain higher concentrations of radioactive and toxic elements each year, and the highwalls and waste dumps are becoming less stable. Each year that the mine site remains unreclaimed results in an increase in the health and safety hazards and an increase in the magnitude and cost of the reclamation.

These conditions are especially critical because the mine area is very important to the Laguna people. The mine is not in a remote area where the conditions at the site would have a small impact on the population. The mine site straddles two perennial rivers that are the major source for irrigation water for the Pueblo. The site is adjacent to the Town of Pagate which is one of the largest communities on the reservation. The site contains religious shrines which are sacred to the pueblo, and the site was previously an area that was intensively farmed. The mine site is, therefore, in an area that is critical to the health and well-being of the Laguna people as well as the people downstream and downwind from the mine site, which includes the Town of Albuquerque.

Anaconda was fully aware of their reclamation obligation when they signed their leases in the 1950s and 60s and when these leases were modified in subsequent years. In addition, Anaconda was advised of their reclamation obligations by the Department of Interior in the early 1970s. Anaconda acknowledged and accepted these obligations both orally and in writing and made a commitment to the full reclamation of the mine site. Anaconda could have taken measures during mining operations to reduce the costs of reclamation; but, instead, Anaconda chose to conduct operations in the most cost-effective manner possible and defer their reclamation obligations to a

later date. This decision was reportedly based on the assumption that Anaconda would be operating the mine for a very long time period and that measures for reclamation could be taken at a later date.

With the unfortunate decline in the uranium industry, Anaconda was forced by economics to close the mine at a date much earlier than anticipated. However, this does not release Anaconda from meeting their reclamation obligations which they had previously deferred. Anaconda, during mining operations, could have placed the easily erodable and highly soluble mine waste and protore at stable locations within their leases; however, they chose to place this material in the flood plain of the two perennial rivers that flow through the site and, in many locations, actually placed this material in the active channels of the rivers.

The additional haul distance required to place the hazardous material at the stable location would have been only a few hundred feet. Anaconda must now clean out these channels and the flood plains to prevent this hazardous material from being washed downstream and spreading the contamination over a much larger area.

Anaconda could have cut the highwalls to a stable slope and with adequate trenching during the mine operation, but they chose to cut them to a slope which would be stable in the very short term. Some of these slopes exceed 80 percent, and much of the highwall is composed of shale. These highwalls are very unstable and have been failing since mining operations ended.

It is important to recognize that these are operational highwalls. This means that they were designed to remain stable only for a very short time period while men were working at the base of the highwall. The highwalls are similar in concept to the construction of a retaining wall while excavating a basement for a house. Neither the retaining wall or Anaconda's highwalls were designed for long-term stability. Anyone who has visited the mine site within this last few years could testify that these highwalls are actively failing right now.

The shale portions of the highwalls are eroding rapidly and are failing and thereby reducing the support they provide to the overlying sandstone units. Large cracks are developing at the top of some of the highwalls, and, since the highwalls often cut major drainages, piping is beginning to occur. Major failures in these highwalls will occur in the near future. The highwalls are an obvious and significant public health hazard, and all of them must be reduced in slope.

Anaconda could have constructed the waste dumps with a shallow slope during mining operations; but, instead, they chose to construct them at the angle of repose, about 45 degrees. The added haul distance to construct shallow slopes would have been a few hundred feet. There are other measures that Anaconda could have taken during mining operations to reduce the cost of reclamation; however, Anaconda failed to take these steps, and they must now fulfill their reclamation obligations.

Anaconda has submitted six reclamation plans over the last eight years; but, each time, the plan has been withdrawn before it could be evaluated and approved by the Department of Interior. One reclamation plan was submitted

for a small portion of the mine site and approved by the Department of Interior as submitted, without modification. However, Anaconda now refuses to comply with their own reclamation plan. Anaconda claims to have withdrawn their reclamation plans because they weren't developed to meet Department of Interior deadlines or because the relocation of State Highway 279 interferes with reclamation operations.

Now, Anaconda was never once given a deadline by the Department of Interior for the submittal of a reclamation plan, and the Laguna Pueblo and the State of New Mexico and Department of Interior had agreed to close the relocated section of Highway 279 during reclamation operations. So Anaconda's stated reasons for withdrawing five of their six reclamation plans is not valid.

Anaconda has submitted to the Department of Interior some 3,000 pages of reports by their own consultants. These consultants identified serious problems at the mine site concerning the following issues: Subsidence, highwall stability, groundwater contamination, groundwater recovery levels, contamination of Quirk Reservoir, surface water contamination, exceedance of federal air quality standards, waste dump slope stability and radiological health impacts.

I'm a little confused by the testimony of their consultants here today because it refutes the 3,000 pages of written reports that they have submitted in the past. Anaconda now refuses to accept their own consultants' reports and would like to withdraw these reports.

Anaconda's fifth reclamation plan, which is identified in this draft EIS as Anaconda's proposal, made great strides towards the resolution of these projects and, with some modification, this plan could have been approved, however, eight years after submitting reclamation plans and with three plans submitted for this EIS process alone, Anaconda is now attempting to withdraw this plan and the reports by their consultants and would like to submit another reclamation plan for consideration in the EIS.

This new plan, which Anaconda calls the Multiple Use Plan, has been termed a sacrifice area plan by others because it would not enable the site to be put to any productive land use. Under this new plan, Anaconda attempts to resolve the issue of contaminated water in the North Pagate Pit by diverting the Rio Pagate into the pit to flush the contaminated water and sediment downstream where this water is used for irrigating crops and stockwatering. The contaminated sediment in the mine has already been found by Anaconda consultants five miles downstream from the mine site, and, under this new plan, it would extend a far greater distance.

This is not an acceptable proposal.

Under this new plan, Anaconda attempts to resolve the issue of the rising levels of the contaminated water in the other pits by planting trees which consume extensive amounts of water by evapotranspiration in the pits in the hope that these trees would consume enough water to keep the groundwater level down.

There are numerous serious problems with this proposal. For instance, there are no guarantees that these trees would remain at the site for a long period of time. Fire or disease could kill the trees, and the contaminated water could very quickly pond on the surface. This is a totally unacceptable plan and not technically defensible.

Under Anaconda's new plan, they would not place four feet of cover on the hazardous material and would thereby not prevent it from being eroded by wind and water erosion.

The deaths by cancer caused by exposure to the radioactive materials would not be reduced to an acceptable level. It was Anaconda and their consultants that previously calculated that four feet of cover was necessary, and now Anaconda is attempting to withdraw what they have said and what the Department of Interior and Laguna Pueblo have already agreed is an absolutely necessary reclamation measure.

There are numerous equally unacceptable portions of this new plan; but, in general, it represents only partial and temporary reclamation of the site. It is not a technically defensible reclamation plan.

The Department of Interior should be commended for the effort that it put into the draft EIS. It's a very complex project, and the draft EIS resolves many of the issues associated with reclamation of the site. However, there are a number of issues in which the department must reevaluate. These issues will be identified in our written comments on the draft EIS, but I would like to discuss a few of them at this time.

MR. RAMPTON: You have two minutes to conclude your statement.

MR. NELSON: How long have I had, sir?

MR. RAMPTON: You've had 11 now. I can give you a little more time, if necessary. I haven't -- I've kept track, but everybody has been pretty well within the time limit except for a couple of exceptions. I can give you the same exception; but, if I do that for everyone, we'll be here until 11:00 this evening. So see if you can conclude within two or three minutes.

MR. NELSON: I can speak tomorrow.

MR. RAMPTON: You can speak tonight again, if you'd like.

MR. NELSON: Some of the issues that the department needs to reevaluate. First, the department has substantially underestimated the number of cancer fatalities that would result from the various reclamation alternatives. I do commend the Department of Interior for having Argonne National Laboratory for conducting the cancer projections. Argonne is the laboratory that specializes in the biological effects of radiation, and Argonne does not have a vested interest in this project. However, there are a number of issues which Argonne has overlooked in their analysis, and a reevaluation of these issues would result in a much higher projection of cancer fatalities and genetic disorders.

Further, the DEIS and Argonne assume that the regional population would remain static over the last 85 years. This, of course, is not accurate. If even a low population growth was assumed, the actual number of cancer fatalities associated with the project would be at least 10 and could be as much as 100 times the fatalities identified in the EIS.

The Argonne report does not account for a source term which is continually increasing in size as the radioactive material is dispersed by wind and water erosion. The Argonne report was based on a detailed airborne Gamma survey conducted by the USGS and is not based on the color of rock, as Anaconda's consultants base their source term.

Blasting during mining operations caused serious damage to the homes in Paguate. Although Anaconda did perform some cosmetic repairs, this damage was never completely repaired and the structural damage was not repaired. This damage will cost a significant amount of money and is a direct result of mining operations and should be assessed in the EIS. The Department of the Interior -- as I'll discuss tonight or tomorrow -- has not effectively resolved the issues of differing projections in the groundwater recovery levels. They accepted Anaconda's latest projections which was not consistent with their earlier projections and was not consistent with the report done by Argonne National Laboratory, nor is it consistent with the USGS report that was done.

The Department of Interior seriously overestimated the long-term stability of the highwalls at the mine site, and I disagree with Anaconda's consultants on this issue.

In summary, the Jackpile-Paguate mine site contains significant public health and safety hazards which must be eliminated or reduced to an acceptable level during reclamation. Due to the presence of two perennial rivers at the mine site, the site is extremely susceptible to erosion and appropriate measures must be taken to insure that erosion does not cause these health and safety hazards to reoccur.

This reclamation is clearly required by Anaconda's lease terms and applicable statutes. This level of reclamation has been required by the Department of Interior and accepted by industry for other uranium projects on Indian lands. Anaconda is not being required to perform a greater level of reclamation than other operators. It just so happens the proximity of the Jackpile Mine site to the regional groundwater system, a highly populated community, its proximity to two perennial and unstable rivers, as well as Anaconda's failure to make reasonable provisions for reclamation during mining operations make it necessary for Anaconda to perform an extensive amount of reclamation at this time.

Anaconda acknowledged and accepted their reclamation obligations during mining operations and made commitments to full reclamation of the site. Anaconda chose to defer these obligations. Anaconda must work in good faith within the established regulatory procedures to resolve this project.

The Department of Interior's draft EIS represents a significant progress towards the resolution of the project, but it must be revised in a number of areas. Among the revisions required are: Reassessment of the groundwater

recovery levels; selecting a preferred alternative which alternative, would provide for backfilling in the future if it turns out that the groundwater level is other than projected; recalculating the health effects to include the increase in population expected in this region and continually increasing source term for those alternatives that do not include complete reclamation and stabilization of the site; requiring the preferred alternative to include making repairs to homes in Pagate; and, lastly, recalculating the safety factors for the highwalls using more accurate and site specific data and including measures to reduce the slopes of the highwalls in the preferred alternative.

MR. RAMPTON: Thank you, Mr. Nelson. If you wish to present any new points tonight, I'll give you time after we've concluded the list of speakers. And if there is any technical data that you wish to add, certainly the time period for submission is still open until October 4th.

Mr. Lockwood.

MR. LOCKWOOD: Good afternoon. My name is Harold Lockwood. I'm a tribal member of the Laguna Tribe, and I'm sorry I don't have any scientific credentials or anything. The only thing that I have that I can lay claim to, I'm an ex-Marine and Vietnam Veteran. Social responsibility. I'm an ex-employee from Anaconda, too, and talk about social responsibility. It seems some of -- while some of us were going to school, there was some of us still fighting in Vietnam for the rights for big companies to make profit. We see that today with India, Bhopal, India. We see it with Three-Mile Island, Agent Orange, and a lot of us have been affected. Now I see it with my own people on the reservation, and what's Anaconda going to do about it? This is what I'd like to know. We fought for the right for them to make profit, and I'd like to see them come back out and help my people.

Religious meaning. The land is laying there open like a sore wound. My people believe in the land. We believe in our Indian ways. We believe in the heavens and stars. You've destroyed my land, and now it's laying there like an ulcer, and I wish that somebody would come back and do something about it.

Blast damage to the homes of Pagate. You know, if I lay this pen here, this is my home. I built a home on this mesa. Now, if I pound this table, this pen is going to drop. It's going to move. If I hit it from underneath, such as the blasting from underground, open pit, this pen is going to move. Now, I'm not a scientist, but I'll never get that pen back in the same exact position as it is now when it falls. That's the same way with our homes. The land is going to shift. Maybe you put a Band-Aid around the houses, but it's never going to be the same. These are the things that my people are looking at.

Highwalls, stable highwalls. These studies were done maybe under normal conditions, no wind, no rain. How many have you been out there on the reservation, lived there, roamed the plains, the forest, the canyons. During a downpour, a thunderstorm when that water is coming over those highwalls and you tell me those rocks are going to be stable. I'd like for us to go out there and stand under those highwalls and see what happens. But that's my land. That's my country.

What the white man taught me, that's God's country; and I hope maybe in the future that industry such as Anaconda, Kerr-McGee -- a lot of people in Grants should be concerned about what goes on here today. It's been stated earlier about a precedence that's going to be set, a precedence that's going to affect mining. Who is it going to affect? The cost for big companies, mining companies to pay less for the damage they do, or is it going to be for the benefit of the people? But let big companies make profit. Thank you.

MR. RAMPTON: Thank you, Mr. Lockwood. Laura Graham.

MS. GRAHAM: Mr. Chairman and members of the panel, my name is Laura Graham, and I live in Pagate, New Mexico. My home is located about three miles west of the open pit. The citizens of Laguna are very concerned and most especially for the people in Pagate with the open pits of the Jackpile-Pagate Uranium Mine. I am the Social Services Director at the Eldery Care Complex in Laguna, and I know that many of the elderly have died and are dying of cancer. I know studies say this has no bearing, but you can't convince us of this proposed fact.

The profile Dr. Lowe described as someone residing in Pagate who may possibly contract cancer, this exactly describes many of the elderly of Pagate. They stay home 24 hours a day in that village because they don't have motor traveling. A lot of them don't drive at all.

The other thing is that there has been a lot of property damage. The walls of the houses are cracked and were repaired without cost in the beginning. Then the materials were charged for while the maintenance was free. Although the cracks were repaired each time they cracked; nevertheless, they are still cracked.

The other concern aside from health dangers is it is really an eye sore, especially when you live with it day in and day out. When Anaconda started mining in Pagate, 1953, the tribal counsel knew so little about uranium mining, and, because the Indians have always tended to trust too much, they did not demand too much of Anaconda in the beginning, and as experts in your respected professions, you took advantage of this because they didn't ask the right questions.

You mention legal obligations of Anaconda. How about humane obligations? Does Anaconda have any concern with this? Laying aside all the expert testimony relating to no health risk or Anaconda's little or no obligation, the people at Laguna would like to see those pits filled. Obviously, nobody can bring landscapes of mesas back to its original structure. Thank you.

MR. RAMPTON: Thank you, Mrs. Graham. Dorothy Purley.

MS. PURLEY: My name is Dorothy Purley, and I'm from the Village of Pagate. It seems after hearing everybody talk, everyone holds some kind of degree, but I'm standing up here only holding a piece of yellow paper, and it says on there, cancer, reclamation, blast damages to the homes in Pagate. Who is responsible for it? Anaconda. Then why does Anaconda want to go back on its word? After all, Anaconda got rich from off of our land, and remember, white man has a slogan saying, "Keep America Beautiful." Then why does it want to

damage places that cannot be fixed, places that cannot be looked at? Our Village of Pagate is crying. It's got tears. I wish Anaconda would do something about this whole thing. Thank you very much.

MR. RAMPTON: Josephine Abeyta.

MS. ABEYTA: My name is Josephine Abeyta. I'm from Pagate Village of Pagate, New Mexico, and I'm one of the members that suffered from the blasting which Anaconda did all the blasting, and there's a lot of us that did suffer from all this blasting, and our roofs, houses were damaged, and I would like to see Anaconda come back and reclaim the land, fix our homes, Village of Pagate and all the damages that Anaconda did. Thank you very much.

MR. RAMPTON: Thank you. Elizabeth Wacondo.

MS. WACONDO: My name is Elizabeth Wacondo, and I'm from the Village of Pagate. I live right in the center of the village, and I think that's where a lot of damage has been done. There's this big dike that has come through right by my yard, and, when Anaconda blasted, that whole thing shook. Anaconda put props on all sides, but that has not held. Once you get a crack in your home, there's no way you can -- they had come back to plaster, but that did not hold.

It is a sad situation that we have to come to this kind of a meeting where we have to testify. I think that we should have been able to get something done, and I know that our people, our roads, the highwalls, cancer has killed our people, our elderly, and nobody can say that -- because I have lived there all my life. My father lived to be 92 years old, my mother 83, but it's a sad situation. You go to work, you come from work, you see the land that has been damaged. I hope that somebody can come out.

And, really, if you lived there day in and day out, it's a very sad thing. Our land has been just torn up. Who's going to refill? Who's going to do? Who's going to repair? I've lived there all my life, and my home has been damaged, and I hope that somebody can come back. I know it can't be ever repaired to the way that my parents built the home for my family. Thank you.

MR. RAMPTON: Thank you, Mrs. Wacondo. John Gaco. Mr. Gaco.

GOVERNOR FERNANDO: Excuse me, Your Honor. He needs an interpreter. He's going to go ahead and talk in his native tongue.

MR. RAMPTON: Mr. Gaco will talk in his native tongue, and his remarks will be interpreted into English.

MR. GACO: I'm 83 years old now, and I think I'm the only one left standing here.

They promised a lot of things. That's the reason a lot of folks believed them, believed those things, and now they don't do anything for the people the way they promised.

I got the farm there right below the mine, and I didn't get much money that place there, and my brother, he had a sheep ranch right between those canyons, and they take away from him.

And there's my oldest brother, he's got a sheep ranch right across the river there.

And he promised us he was going to build up a ditch, irrigation ditch, clean up whenever we need to farm there; but, after that mine starts, they don't do anything anymore. Everything is just passed away now. This all I will say. Thank you.

MR. RAMPTON: Thank you Mr. Gaco.

We'll have a translation by -- will you give your name to the reporter, please?

MR. BEGAY: Thank you. I'm Delfino Begay. I'm also from the Pueblo of Laguna, and my governor has indicated that when interpretation is required here that I would stand ready and make the comments or interpret the comments made by the people here that are before you.

As you heard, Mr. Gaco has indicated he is from the Village of Paguate, also from the Pueblo Lands of Laguna. In his remarks here, he first indicated his greetings to you and his gratitude for being able to stand before you and make his comments and testify on behalf of himself and also on behalf of other fellow members who reside in the Village of Paguate and also in the Lands of Laguna.

He indicated first that, as you see him here, a man at his age, he has gone through the turmoil and through life and has indicated that he is one of the last surviving older members who have seen from the very beginning through his age, and there were times when Anaconda Copper Company first came upon Laguna lands and when they first started their mining process and operations, and he indicated that first he and his brothers and fellow members were farmers of the land that is in question at this point here and where the mine now rests and is abandoned.

His brothers were farmers and raisers of stock, cattle and sheep at that time. He remembered at the time and the onset of Anaconda Copper Company's first initial moves in the operations of the Jackpile Mine. He indicated that many things were agreed to by the two parties, Anaconda and also the Pueblo of Laguna, and that agreements were made initially when the lease was made and the agreements were made; that, when the cease of the mine would ever come to play a legal, moral and financial obligations were to be adhered to and agreed to by Anaconda Copper Company at the time.

He still remembers this and wishes to convey this information to you the public, to you the members of this state and the community and to the members of the panel, and his only desire and his plea at this time is to assure the Pueblo of Laguna and its inhabitants that Anaconda would stand fast on its legal, moral, social obligations; that some day amends would be made so that we would be able to use and maintain our land the way we did in the past.

This is what I understand and these are basically the remarks of Mr. John Gaco from the Village of Paguate and tribal lands of Laguna.

MR. RAMPTON: Mr. Anaya.

MR. ANAYA: My name is Tim Anaya. I'm a member of the Laguna Pueblo. I'm a former governor also of the pueblo. I want to say that I have worked at the mine for quite a few years. During my term in office, we had good relationship with that company, Anaconda. There's a fellow by the name of Albert Fitch, John Herndon and a Harry Alexander, the mine superintendent. We had good relationship. We got along fine. Any problems that arises, we met together, discussed it. We had good communications.

Today I find that communication is lacking. I always feel that if there's a problem, if there's any major thing to be resolved, people, we are supposed to get together. We are supposed to work together, solve that problem. I don't see this today. There's a gap in between.

I believe for the common interests of this country and the people in it, we should take the problems and solve them together, not on separate basis. This is the way I see things. This is what we believe in Laguna. We believe in the great spirit to give up the guiding hand and the wisdom together with whoever is doing business with us to solve these problems. I recommend strongly, very strongly and seriously to help us, to help our tribal counsel, DOI and Anaconda Company.

There is still today existing a certain amount of radiation. I have never seen Laguna people who have passed on on the account of cancer until this has been going on since our operations, mining operations at Laguna.

Yes, there are still cracks in the homes of Village of Paguate. Some cracks you could stick your hands in it. Just picture yourselves, your homes if it's cracked up like that. Would you take it laying down, somebody comes along, do some blasting nearby and your homes are cracked? Would you stand there and must take it and then forget about it? I don't think so. Today we're asking you, let's get going, let's don't delay, let's take care of those people out there. They're humans, too, just like all the rest of us here. We have a problem to face, let's tackle it. Let's have the courage to sit down, talk about it, negotiate it, and let's solve these problems. I call on you Anaconda and DOI to help the people in Laguna.

During my term at the job at the mine, during noon hours or certain hours of the day, the blasting siren would go off, and we would clear the area. Generally, we have to clear the area. Many times, I would stand and watch when the blast goes off. On a clear, calm day, you could see that dust from the blast slowly go towards the Village of Paguate. Sometimes it's yellow dust, sometimes it's that dark black dust cover the whole village. I've seen this many a time. Then you wonder about the effects of this type of thing. I wonder how long it will take, 25 years, 50 years, 100 years from now. Yes, today there is definitely erosions going on, the highwalls.

One more thing, I have a grandson that's nine years old this past March. He has a weakness in the joints in his bones, got weak bones. He's not like his

brothers and sisters who are normal. His father worked at the mine just before he was born. It is what we call a walk-in, underground mine. There was no buildings where the people -- where the workers could take shower yet. Later on, there was buildings with showers, change clothes, lockers, but this was before.

His father worked underground in the walk-in. The wives used to go over and pick them up at quitting time in the evening. He would come out with his work clothes all full of muck, shoes and all, coveralls, get in the car, and the mother was pregnant with this child. Today, he's got records in the Indian health service hospital about an inch thick, and it has not yet been resolved what it is. What is this? He's still under a survey and study, off and on he goes to the hospital. He complains of stomach pains, internal pains, exterior pains. They have ruled out the alcoholism syndrome on him. They have ruled it out. This is not it. I know this is what they called Indian child care evaluation.

Very recently, just last year, they came out with another term. It's a technical term -- name, a technical name. Medical name is -- what it was as I was interpreted -- is curvature of the spine, and they're still looking into these areas what causes it. They cannot pinpoint, but looking back and looking around, some of our relations have passed on who is not yet due to have passed on who have worked at the mine. When they have come about, the interpretation is cancer.

I don't know. Nobody really knows. Nobody can really pinpoint these things. I'm not a doctor. I'm not a professional, doctor of any kind, but where is Anaconda? So again I call on all of you. Who has the responsibility? Who has the legal obligation to help these people, to help us at Laguna? Thank you.

MR. RAMPTON: Thank you, Mr. Anaya. Santiago Sarracino. I think Mr. Sarracino might need an interpreter.

MR. SARRACINO: How is everybody? Ladies and gentlemen, my name is Santiago Sarracino. My birthday is yesterday. I'm 65 years old, but I can't talk good English like you people. I don't have any school, but I learn from white people.

MR. RAMPTON: Thank you, Mr. Sarracino.

MR. BEGAY: As you heard, Mr. Sarracino is also a member of the Pueblo of Laguna. He first indicated and sends his greetings to the people in the hearings here who have taken the time out to make themselves available to hear the terms and comments that he's ready to pose before you.

First of all, he indicated that we're here for the general purpose of trying to resolve the questions at hand, the concerns and the problem areas that we have addressed. His ideas and his position here is based on the old citizenry of Laguna, the past administrators of tribal government, our forefathers who have indicated to us how the manner of living should be done at last, what believes Laguna, what beliefs and culture aspects and concepts should be followed. He maintains that belief and is imbedded in his mind and in his heart.

Secondly, he mentioned that he remembers, though he lived most of the time off the pueblo lands, lived in other states during his employment, he remembers that the past administration and past councilmen and representatives of the Pueblo Laguna indicated to him and made it known to the general membership that those proceedings when Anaconda Copper Company first obtained the permit for leasing and then also leasing for the lands to start their mining operations, he remembers that the people were well informed of the intent of the mining company as to what was to be done and, in turn, what was the benefits of the Pueblo of Laguna and its citizenry.

He indicated that the members and management people of the company made a special effort to be informed and to inform one another as to the day-to-day operations, as to the short and long-range planning, as to what may be the impact both in health, social, the economics and whatever other benefits may be derived from the operations of the mining. He remembers this, and he wants to convey this information to you that he continues to stand fast and to indicate to the management people of Anaconda Minerals Company that he remembers these agreements, and, in turn, management of Anaconda should remember those agreements that were made and entered into by the past administrations, namely from 52 and 53, and all other consequent changes that were made after those times.

He wishes to relay to management and to representatives of Anaconda Minerals Company that these things were not made just at the spur of the moment, but indicate that these things were agreements that were agreed to by not probably yourself, but by other people that were here prior to that are present, and he wanted to see that these things, these agreements would be maintained up to the present time. He also indicated that it is difficult to communicate it as he cited.

In the past, tribal administration, members of the counsel and representatives of the counsel and people of the management of Anaconda Company made it a special effort to keep in touch with all the people that were concerned, and especially the general membership of the pueblo. He feels and has concerns that Anaconda at this point here now from what he hears now may not meet its obligations, whether it be legal, moral, social, whatever the situation is. He has some concern as to Anaconda's position at this time. With that, he maintains his position that Anaconda has the obligation to meet those requirements. As outlined in those previous agreements by the past administration and also up to the present time, for whatever the mechanics are in regards to making these in reaching a remedy or some resolution of the issue at hand, he feels that Anaconda is obligated to meet those obligations and should stand fast to those comments.

He mentions the appreciation of the financial consideration both to the company and to the Pueblo of Laguna, but that has some merit at this point here, but that would be a secondary consideration based on agreements made by the past administration and members and management of Anaconda Copper and Anaconda Minerals. He cited that he has personal knowledge and is aware of the damages to the homes of the residents of Pagate Village; that, in turn, he maintains that position that it is Anaconda's position to see that resolution is made in some way, financial assistance to be registered to those people who reside in the village and who have suffered the consequences.

He mentions all the culture property and the shrines and the position that he maintains to protect and maintain those properties and shrines; and he, as a Native American, maintains his cultural belief and practices regarding his Indian religion. He wants to emphasize that and keeping in mind he's aware of the health and safety impacts of the mining operations, pre-mining and post-mining.

He is aware that people may suffer ill effects or consequent health damage to themselves due to either participating in the mining operations or residing close to the mine site itself. He has concern about protection of the environment, as you indicated, and all the technical papers that submitted. He is aware that the protection of the environment is critical, and his position at this point here is that Anaconda and all the cooperating agencies and parties should be aware that protection of the village and environment should be considered first and made mandatory as part of a whole reclamation project.

In the future, he hopes that whatever agreements, whatever decisions are reached, whether through the parties themselves or through the hands and the decisions of the trustee and the federal government that, in turn, he does not wish anybody any ill feelings, but wishes that Anaconda and through its corporate entities and all the other people in management, that they do gain success, and he wishes you well and, in turn, the Pueblo of Laguna in respect to their wants and needs, hopes that they will find some remedy, some solution to the issues at hand.

Basically these are his comments. He's made a number of points; but, to my best of my ability, I've related what he has said to you in general. Thank you.

MR. RAMPTON: He does a remarkable job. Since we do have to come back at 7:30, we have no alternative -- even though we're within two of completing the speakers who have signed up to speak this afternoon -- I think that we all deserve at least an hour and 20 minutes for supper. Are we coming back at 7:00 or 7:30?

MR. POOL: 7:00.

MR. RAMPTON: I was thinking 7:30. We don't have that much time. This hearing is in recess until 7:00 pm. (Recess taken)

MR. RAMPTON: This hearing will come to order. This is the second session of the hearing that we've been conducting all afternoon. Is there anyone present who does not understand the purpose of this hearing and the ground rules under which we have been operating? Are there any questions as to what we are doing here and how? If not, I won't go into detail as to why we're here, because everyone knows it.

Our first speaker this evening Harold Sawtron. If Mr. Sawtron is present, he should come forward now. If he is not, we will pass his name, and I will call it again at the conclusion of the other speakers that have signed for participation.

Bobby Vallejos. Well, we didn't give everyone too much time to have their dinner, so we'll make allowances for that. Pass Mr. Vallejos.

Louise Cheromiah. Cheromiah. Ms. Cheromiah.

MS. CHEROMIAH: I'm Louise Cheromiah --

THE COURT: Would you pull the mike down close, please?

MS. CHEROMIAH: -- from Paguete. I'm speaking this on behalf of my people and myself on what's ailing us up in the village. What I have to say is that I don't know if anybody can believe how our homes are all cracking up from the blasting. Of course, a lot of them say it's not causing; but, when I live in a home like that, it's from the blasting that has cracked our homes.

My husband worked for Anaconda for 20 years, and he says that after he retires, he was going to have the house fixed where he can watch them because, before that, they had already worked on his house, it didn't do any good, but he didn't make it. He passed away. So he was gone. We had the house worked on, and nothing was done.

The cracks in the homes you can see through, and where they worked, they put tape or some kind of paper over those cracks and try to plaster over it. Now, it's all coming down, and there's no lie about what other people have said about our homes. Only a person that lives in it can believe it. So I hope that we can get some kind of help to really have our homes, houses restored, but I'm sure nothing will ever be the way it was before after this is all done.

So in great hopes that people are here to help us, we will believe what we're trying to put before you people and in hopes that we can have our homes restored -- because I hate to move out of my home afraid that the whole thing will collapse one day. I have to move to an older home.

So this is all I have to say for myself or my people, and I hope you people can believe what each and every person that has come before, what we are saying about our homes. This is all I have to say. Thank you.

MR. RAMPTON: Thank you very much, Mrs. Cheromiah. Clarence Acoya.

MR. ACOYA: I'm Clarence Acoya, and I grew up at Laguna Pueblo at Paguete, and I work in Denver, Colorado. I came all the way from Denver to try to be with you and to see what the whole purpose is at this particular point. I feel that the -- I've studied through the manual of the Environmental Impact Statement. It appears to me that the whole purpose of this thing is to return and stabilize the mine site to restore productivity to the use of the land and insure that adverse environmental impact has been restored to the point where it is not dangerous anymore, and I believe that, coming from that area, I believe in that. Certainly that in terms of what has happened at the mine, I think we've sacrificed economy for safety and health situation; but, nevertheless, that's what sometimes economics is all about.

I feel that the proposals made by Anaconda, by the Department of Interior and the Pueblo of Laguna are pretty much in line with what needs to be done. I think what we need basically to do is to compromise at a point along the way

so that this whole thing can begin. I feel that, as an individual and a member of the pueblo, that there has to be something done at this particular point. It has gone for several years without anything being done, with the exception of possibly holding security out there to the point so that people are not tromping over the hills and so forth, and I believe that the areas that are being considered for restoration to begin seems to me that this is what I would personally like to see, that I think it is a danger -- I think we've underplayed the danger of uranium, the radiation and so forth pretty much, and I feel that those people who perhaps may have come down with some health problems certainly realize that there is danger out there.

There is danger everywhere within the radius of 50 miles, and this is what the book is saying. I feel that perhaps with a concerted effort of those that have studied through this thing, those people that are on the committees or whomever might be involved to tell us exactly what can be done to restore that land out there, certainly is what I, as a pueblo person, would like to see. I thank you very much, sir.

MR. RAMPTON: Thank you, Mr. Acoya. John Delores.

MR. DELORES: My name is John Delores, and I've worked with Anaconda 31 and a half years. I recently retired about, oh, about a year ago, and--well, let's see where I start now. I don't know. I don't know. These Anaconda people are holding their words what they have promised. How many superintendents had gone by that didn't leave their word there, what Laguna tribe and Anaconda agreed, whether verbal agreement or in writing. Who has known Jack Naboles? Any of you know Jack Naboles? Still young yet, you don't know. See. This is where the mistake is, uranium all young yet maybe. Who knows Albert Fitch? You guys are too young yet to know what the promise Anaconda had gave to Laguna Tribe. This is where your mistake.

I know you're smart, you know too much from the writing, from everything that you figure on the papers; but, if you go out there to Paguate, okay, you will see a lot of ruined houses, a lot of ruined grounds, and all the houses were cracked and all those things. You should have gone up there and seen before you speak here today, you should have gone there first. This is where the mistake is. I'm sorry to say this. I know because I worked with Anaconda from the beginning of 1952, and I am an old man, was on the negotiation team with the Laguna Tribe council and they had agreement with--and I remember what their agreement was, but Anaconda--I'm sorry to say, Anaconda never went along with the regulations and the rules in Laguna; or what Anaconda had promised to us, they never went along with.

Even Jack Naboles, the superintendent said, "If I don't do right here on the reservation, get me out of here". This is what he said. My in-law tells me this. Yes, like I said, how many superintendents went by without leaving a word there what Laguna had agreed with Anaconda. There's a lot of promises. There's a lot of promises.

He said one time, "200 men is going to work steady right here in the mine". What happened in 1963? Anybody remember what happened? We were all laid off because Anaconda was going too far over the creek, where Tribe never knew about it. Anaconda should have come back and say, "Get Tribe together," and

say, "I'm going over to the creek and going to start mining over there." There's no word. That's where everybody was laid off. Even I was laid off. I had more seniority over there than any of these Anaconda workers.

What happened to the stocks? Okay. All that writing. Right in that creek, when they arranged all the water, runs right in the crack. Do you know the creek goes where we were trying to water our poor animals? What happened? They got sick from the rain.

Every morning, if you ever go by in the morning, you can see all that smoke or flame coming out from the ground. That's the radiation right off the ground. You can see it. Can anybody believe that? All right. Okay.

Reclamation of the Jackpile-Paguate because the site is a public health and safety hazard, additionally, and more serious hazards develop when the site is not reclaimed, and the mining lease terms of federal regulation, it requires that reclamation--people formed by the leaseholder. That's Anaconda, okay. They're going to start tomorrow over there, start reclaiming that place over there. To me it looks like that because it looks bad up there.

Poor people, they're getting sick over there. Anaconda promise that the holes will be filled out which was disturbed, the trees planted, grass planted where animals would eat the grass. This is what the promise was. It never done. To every working man exposed that kept working. But what happened? In 63, I told you already.

The houses that are damaged by blasting are supposed to be repaired free. Okay. They have to pay half of what Anaconda charges over there. He doesn't do free. See, those are the promises from Anaconda.

I don't know if I'm lying, if you people won't believe me, why, that's all right. So okay.

Religious places. Anaconda ruin all my religious places, too. They blasted. I don't have no belief no more, like. These are the things that Anaconda went through but staying right through, climbing over on my land. Okay. Laguna proposed all mortar would be placed in the pits above the ground. Water recovery levels for future recovery. South Paguate would be completely backfilled eliminating the highwalls and all associated impact. The North Paguate high pit highwalls would be buttressed to its crest eliminating all the highwalls and all associated compact. Reclamation. I read that already. Okay. That's about what I got to say. Thank you.

MR. RAMPTON: Thank you, Mr. Delores. Mr. David Lester.

MR. LESTER: Your Honor and members of the panel, I'm pleased to present a statement from the Council of Energy Resource Tribes, an organization founded by Indian Tribes to assist them in protecting and managing their natural resources.

The Pueblo of Laguna is a founding member of the organization. Our organization has a staff of environmental scientists and engineers along with specialists in natural resource development and management. As you know, the Jackpile-Paguate Mines were considered to be the largest open pit mines in the

world. You've already received testimony that documents the huge volume of material that was removed, the acreage that was disturbed by mining activities, revenues and employment that was produced from the mine.

The Pueblo of Laguna is approximately 6 to 7,000. That's a little different than saying that a city in the United States or a small community has 6 or 7,000 residents. There are only 6 or 7,000 Laguna Pueblo people in the whole world. The land that is theirs has been theirs since time immemorial. The land that has been disturbed, as was so eloquently stated earlier, has great significance to the pueblo people. I cannot overemphasize the importance of reclamation to the very essence of the future of the Laguna people and their way of life.

As Indian people are valued, is that the earth and the land and the resources in it should not be destroyed. Used, yes; and, after use, to be restored. It is without question in our considered judgment that the abandoned mines, the open pits, as well as the underground mines, represent a serious threat to the land, to the air and water.

When you consider that land, air and water are the necessary ingredients for life itself, it is no wonder that we consider the abandoned mines to be a threat to the very existence and the way of life of the pueblos.

I'd like to address two major points. First of all, in 1981-82, the Anaconda Company put forward what is known as the Green Book Plan. The pueblo took this proposal very seriously, and, with the support of the Department of Interior and with technical assistance with the Council of Energy Resource Tribes and other consultants that it employed began to pile through voluminous amount of documents, data, scientific information that it was ill-equipped to assimilate and translate back into the very essence or the self-interest and the future survival of the Tribe, but it accepted as a legitimate process the EIS and is prepared to work through the legitimate processes available to it, to resolve the differences between its preferred reclamation plan and the Green Book.

Now, there are some things that we'd like to point out on it, and I believe, in prior testimony, that the discrepancy or the shortcomings of the EIS document, it doesn't deal adequately with damages to homes of Pagueate Village. It doesn't deal adequately with the long-term health for miners as well as the residents on the reservation, particularly those villages adjacent or in close proximity to the mining activity. It doesn't deal adequately with the siltation of the Pagueate Reservoir or the radiation contamination at the Quirk Reservoir. It doesn't deal economically with the socioeconomic impact on the pueblo, but the implicit cooperation and the explicit cooperation expressed by officials of the Anaconda Company, both orally and in writing, led the pueblo to believe that the process was accepted and that the cooperation of the company would continue.

I think the record will show that the pueblo has acted and is now acting in good faith. I'm afraid -- and it appears perhaps that the company is seeking to find a loophole to break faith with the pueblo, the members of the pueblo and with its public responsibilities. The pueblo was not unresponsive to the initiatives of Anaconda; but, as I pointed out, it took time for the pueblo,

its staff, its council and its people to pile through the volumes, to understand the technical issues and to wrestle with them themselves as they understood that any decision made in this generation is going to affect all future generations of the people of the Laguna Pueblo. I'd like to point out that the differences between the tribal proposal and the 1981-82 Green Book Plan represented about a five-percent difference in actual money.

The new proposal, be it at 8 million or 5 million -- and I haven't had a chance to review completely the new proposal -- represents a divergence of almost 95 percent from the plan put forward by the pueblo. It's unacceptable because it doesn't deal with many of the issues that the Green Book Plan dealt with, and, of course, it does not deal with the issues that the Green Book did not deal with. In fact, it denies ultimately that there is a danger to land, air, water or to life.

We believe that it represents not only a serious hazard to the people of Laguna Pueblo, but also a hazard to other residents in New Mexico in as much as wind and water erosion over the years has sculptured the landscape as we know it now and continues to do so year by year, and so the contamination will continue to grow and spread perhaps to Texas, perhaps to Mexico through the Rio Grande; but definitely the water systems, as you can see on the maps, will carry the contamination as wind and water erosion occur.

These are the concerns that we have in reviewing and working closely with the pueblo, and I'd like to say that we support the testimony of Governor Fernando who delivered testimony earlier today. Thank you.

MR. ALLAN: Mr. Lester, can I ask you one question for clarification? When you say that the draft EIS does not adequately deal with the health of miners and residents, are you talking about impacts associated with past mining activity, or are you talking about impacts resulting from reclamation or post-reclamation?

THE WITNESS: I'm specifically targeting my comment on those impacts that occurred to the workers during mining activities.

MR. ALLAN: Thank you.

MR. RAMPTON: Thank you, Mr. Lester. Lloyd Dailey.

MR. DAILEY: Thank you, panel. Ladies and gentlemen, my name is Lloyd Dailey from the Village of Pagate. I just want to voice my concerns on the reclamation issue at hand. I myself, as a Laguna member, not only speak for the Village of Pagate, but the entire pueblo. It has been awhile since reclamation has been talked about, and it comes to the concern of the people when and what year will it take place for the reclamation. I believe not only for myself but the entire people are kind of tired of wondering when it's going to start. We feel that -- well, for myself, I felt that with these pending cases that we've had with the reclamation issue, I thought that it was going to start. Evidently, it hasn't started yet, and there's not only -- when we've heard a lot of concerns about the people, how they felt about it, how it was hurting the health of our people, but also I don't think anybody's mentioned that when these blast damage -- I mean, the blasting that was occurring, that each time they blasted, that after the dust or the powder has

been floating in the air, at times when the people sat at their dinner table, it would come into their homes, and I feel that anybody who wants to enjoy a decent meal wouldn't like that taste inside their mouths, and I believe the people feel this way, too. We've stressed these problems to you, and we'd like to ask you, please, get something done. Thank you.

MR. RAMPTON: Thank you, Mr. Dailey. Paul DePino.

MR. DePINO: Good evening, panel. My name is Paul DePino. I'm from the Village of Encinal, and my village is located about seven miles west of the Jackpile Uranium Mine. A lot has already been said earlier this afternoon and this evening regarding the reclamation, and all I can do would be to reiterate what's already been said, and I think our biggest concern is that the mine be reclaimed to a safe state and to see the people of Paguata and the people of Laguna as a whole justly compensated.

I can sympathize with the people in Paguata regarding the blast damage because, in the village where I live, even though it's seven miles away, we could still feel the vibrations from the blasting that was done in the Jackpile Mine. My mother's house, which is an old structure, has cracks in it because of the blast damage.

Now, the people of my village aren't requesting compensation; but, you know, you can see that the damage has been done because of the blasting.

A lot of things have been said by the elders earlier today, and I'm still a young man, and I'm still learning quite a bit, but a lot of what the elders have said are true. Anaconda has made promises, and these thing I heard of when I was younger. We call it from the mouth or from their lips. I think the Anglos call it by a different language. I think they call it a gentlemen's agreement, and whether or not they still hold true to those gentlemen's agreements, I don't know. I haven't seen it yet.

Over the last ten years or so, I have had the privilege of serving the people of Laguna in various capacities. Last year, I had the honor to serve the people of Laguna in the capacity of war chief, which is a religious position, and in that capacity, it was my responsibility to visit various religious sites throughout the reservation, and it saddens me to say that some of the religious sites located within the Jackpile Mine area had been disturbed. It goes without saying, and my people say, that a lot of these sites can never be restored because we don't have the ability -- we don't know how those sites were established. They have been there for as long as most of my people can remember. They are important sites to us. They are religious sites, and, you know, it's part of our culture, part of our tradition that some of these areas be respected.

How these happened, I don't know, maybe some oversight by some individual; but, as I said earlier, they know one can compensate us for the loss of those sites. With the loss of those sites, we lose part of our tradition, part of our culture.

I would like to see some justice done regarding these hearings, and it's my hope, and my prayer along with the majority of the people at Laguna that somehow justice is served. Thank you.

MR. RAMPTON: Thank you, Mr. DePino. Herman Garcia.

MR. GARCIA: Thank you, panel, ladies and gentlemen. My name is Herman Garcia, and I am from the Village of Paguate, and I've heard a lot of comments and so forth from the past. During the negotiations prior to 1953, I had the opportunity to be there when Anaconda's representatives and our representatives were there.

At that time, certain commitments and agreements were made, and that's beside the point, but what gets me is why some of these things were never incorporated into the contract or lease agreement, and, if they were, maybe we wouldn't be arguing this point today. To me, I feel that's uncalled for.

We've gone through a lot of stress on account of these issues and so forth, mainly on account of what's happened over in Paguate and being exposed to the open pit over there at the mine and why it's taking us this long to cover this danger spot.

Like Paul said something must have happened, and I don't really know whose fault it is. My only excuse is that, at that time, it was very inconvenient for my Tribe. Our main office was one big old trunk. That's where we kept our records. We didn't have no files or nothing. So we had representatives there, and how all these things were missed is beyond me because, even if there was no law governing reclamation, state or federal, this was mentioned, and one of the questions were that was brought out by one of our tribal members was that maybe if we go underground, we'd be creating a lifelong problem.

Anaconda's comment to that was, "If you're going to have that life-long problem, then if it takes me for life, I'll keep on coming back until that problem is taken care of." So, to me, I feel that reclamation part is taken care of.

Also, at that time, Anaconda was going to build homes, shops and so forth. After mining was completed, Anaconda was just going to turn everything back over to the tribe; but, last year, when this was presented to us by the Anaconda people over in Laguna, there was price tags on the homes, the railroad spur and the shop buildings, and also Anaconda wasn't obligated for damages or anything, but he did make a goodwill gesture offer, and, at that time, that shouldn't have happened because there was a commitment made concerning the blast damages over in Paguate.

This was thoroughly discussed prior to the mining operations, and that is why I questioned a lot of these things, and now I think the reason why the people in the Pueblo of Laguna are kind of concerned about this cancer illness is because like -- and please don't compare it with the City of Albuquerque or New York. I come from a very small village, and I don't know how you'd figure that out; but, last year, in the Village at Paguate alone, we lost five people from cancer, and I'd guess that's a very small rate. I don't know.

Then, again, a reference to how long it would take for you to be affected by radiation. I've heard in the past you have taken 20, 30 years, and those people have been there before the mining operation up until the time they

died. All right. So far, I can't really prove whether it was caused from being exposed to that mining site, but why I question these is because, evidently, these people that I'm talking about were nondrinkers and nonsmokers.

They say you can catch cancer from smoking, cirrhosis of the liver, from overindulgence of intoxicants. All right. One lady died from cirrhosis of the liver, and I never saw her or nobody never knew her to be a drinking woman. So that's why I can't help wondering and question these things, and it has nothing to do with my being hardheaded or trying to get anything from anybody that I don't deserve, but I think these things were already well taken care of, and then we just sort of got kicked around later on.

That's why we're having such a hard time, and I think we've been as reasonable as we possibly could be, but how much longer do we have to wait to cover the land, the one we consider dangerous. I have to work because I can't really go by these studies, I'm no expert, and I think it would really make me feel good -- like the ponds we consider hazardous, I'd like for some of these experts to go out there and swim in those ponds. Then when I see them swim, then maybe I feel more secure, and we might be able to swallow some of these studies that have been introduced here today. And this is all I have to say. Thank you.

MR. RAMPTON: Thank you, Mr. Garcia. Going back to the two names that I called at the beginning of this second session, maybe they were delayed getting back from their dinner. In any event, if they're here now, I call Harold Sawtron. We'll pass Mr. Sawtron. Bobby Vallejos.

Now, there is time. Evidently I cut Mr. Nelson off, and he was speaking for the Tribe, and the Tribe is still having its turn at bat, and, if Mr. Nelson at this time wants to say a few extra words, I'll give him that opportunity.

Do you wish to, Mr. Nelson, or do you wish to expand on your remarks tomorrow?

MR. NELSON: I'd prefer to do it tomorrow.

MR. RAMPTON: All right. Then if there is no one present now who has not signed up, I'll give them the opportunity to come forward, if they wish. If not, I'd like to congratulate the people who have participated. Their presentations have been excellent in line with the rules established, and I appreciate the courtesy of this audience. This hearing is in recess until tomorrow afternoon at 1:00 p.m. in the community hall, Village of Old Laguna. Thank you very much.

(Hearing recessed at 7:55 p.m.)

LAGUNA PUBLIC HEARING SEPTEMBER 11, 1985

MR. RAMPTON: This hearing will come to order. My name is John Rampton. I am an administrative law judge with the Department of the Interior. I have been asked to chair this proceeding today. The purpose of the hearing is to receive public comments on the merits of the mine reclamation alternatives and technical accuracy of the DEIS for the Jackpile-Paguate Uranium Mine.

The members of the panel who will hear your comments today, starting at my right, are Mike Pool. He's the Environmental Impact Statement team leader; Bill Allen, area environmental protection specialist; and John Andrews, the EIS technical coordinator.

They are here to receive your comments. They are not here to ask questions or to answer your questions. However, if for any clarifying purpose, they may wish to ask a question, it should not be taken as a predetermined position on their part.

There will be a verbatim transcript made of everything that is said at this hearing today. Our reporter Michele Trujillo, and in order to have everything taken down verbatim, it's necessary that only one person speak at a time.

I will, from the list that has been given to me, call your name, ask you to step forward, take the podium and give your presentation.

If you have a prewritten statement that you will be reading from, I will ask you to give a copy to the reporter so that she can follow along. This is in the case of technical papers, so that the transcript is accurate. If you do not have a copy of your statement and wish to present it later, you can do that.

Now, the comment period was opened on March 6th, 1985, and it ends as of the close of business on October 4th, 1985, so that, if you wish to add to whatever you might say today or present any additional written comments, they should be in before the end of the comment period on October 4th.

We held a previous session yesterday in Albuquerque at 1:00 p.m. until 5:30 p.m., starting again at 7:00, and it went until about 8:00. This is the third session, actually, of this public hearing.

We will go, if necessary, until about 5:00 tonight and then recess the hearing until 7:00 and will go as late as necessary to receive your comments.

We are asking that you place a 10-minute time limit on your presentation so that everybody will have an opportunity to speak. Hopefully, at the end of 10 minutes, you can conclude your statement, and I will just give you a little warning signal. Most of you, I am sure, will not need to take that full 10 minutes, but that's sort of an arbitrary time allowed to give whatever you feel is relevant to these proceedings.

I would like to ask you, if possible, to keep your remarks as relevant as possible to the main purpose of this hearing, which is to comment on this Jackpile-Paguate DEIS.

I am also asking that, unless you find that you cannot contain yourself, that you refrain from applauding the speaker, because that takes additional time. But I am recognizing the realities of the situation. So, if you feel that you must applaud, keep it short.

If you need a copy of the transcript and for any reason want to have your own copy, you can make your own arrangements with Michele. Along with some of the exhibits that are introduced today, the transcript will be available for public inspection at the office of Mike Pool, and you can contact him for an opportunity to review the testimony and any exhibits.

If you have anything in addition to what you say here, any statement or any visual exhibit, if you would present them to the reporter, she will mark them as an exhibit, which will accompany the transcript as part of the record of this proceeding.

Our first speaker this afternoon will be Meade Stirland, followed by Susan Smith.

MR. STIRLAND: Good afternoon, ladies and gentlemen, Mr. Hearing Officer and members of the panel. My name is Meade Stirland. I am general manager, Anaconda Minerals Company, New Mexico Operations. The Jackpile-Paguate Mine is part of the New Mexico operation.

To give you some measure of perspective, I will give a brief review of some of the past events related to the Jackpile-Paguate Mine. The Jackpile Mine was started in late 1951. Mining continued at the site until 12 February, 1982, when all mining activity ended. During the more than 30 years of mining activity, approximately 400 million tons of material were moved, which included over 22 million tons of ore that was shipped to our mill near Bluewater.

Over the life of the mine, the average Laguna work force was 650 workers who received wages exceeding 85 million dollars. In addition to wages paid by Anaconda, over 71 million dollars were paid to the Pueblo of Laguna as royalties, \$200,000 in lease payments, and over 2.4 million in contributions and village maintenance and upkeep. Additional unlisted millions of dollars were spent for goods and services which benefited all the local communities.

In contrast to the economic benefit to local communities, the economics for Anaconda have not been good. Overall, the New Mexico operations have been a net loss for the company.

In 1977, Anaconda submitted a mining and reclamation plan to the Department of Interior in response to requirements to the applicable mining regulations and requests of the department. In 1979, Anaconda submitted an updated version of this plan. Both of these plans were primarily mining plans which addressed reclamation in a general sense. Neither of these plans were accepted nor rejected by the department or the pueblo.

In September of 1980, we submitted a detailed reclamation plan to the Department of Interior and to the Pueblo of Laguna. This plan was referred to as the "Orange Book." When we submitted this plan, the department, with the

encouragement of the pueblo, decided that an environmental impact statement was necessary, and they proceeded with the process. This process, which started in late 1980, is not yet complete and has been a major reason the reclamation at the mining site has not started.

In July, 1981, Anaconda was informed of plans by the pueblo and the New Mexico State Highway Department to relocate State Road 279 through the middle of the mine area. As a result of anticipated impact to our reclamation plan, Anaconda withdrew the Orange Book plan in August of 81.

After resolving conditions of the rerouting of State Road 279 and reassessing our position with respect to recent changes in regulations, Anaconda made revisions to the plan, and in March, 1982, submitted a plan known as the "Green Book" plan to the department and the pueblo. This Green Book reclamation plan is identified as Anaconda's plan in the Draft Environmental Impact Statement.

Over these four and a half years since we submitted the original detailed plan, Anaconda has worked closely with the department and the pueblo to explain our plan, to understand the department and the pueblo proposals and to determine what reclamation is needed and suited for the Jackpile-Paguate Mine site.

We think we have learned much during this process. We have given our reclamation plan development very high in-house priority and have employed the most competent consultants available to us at a cost of over 300 million dollars to date. As a result of this effort, we now believe the Green Book plan is obsolete and represents neither the most prudent reclamation procedures for the Jackpile-Paguate Mine site nor the most prudent use of resources.

Using the technical expertise of our consultants, Anaconda has developed a new reclamation plan based on the best available information about mine conditions and state-of-the-art reclamation techniques. We call this plan the 1985 Multiple Land Use Reclamation Plan. It is far superior to any of the alternatives examined in the draft EIS, because it will provide for multiple beneficial uses of the land, including grazing, water resources development, recreation, fish and wildlife habitat and future mining use. Anaconda has submitted this plan to the department for their approval and has withdrawn the Green Book proposal.

Although we have withdrawn the 1982 Green Book reclamation plan, all of our consultants' reports are still valid, and we request that they remain as part of the EIS record. In some cases, early reports have been updated by new, more complete studies which have also been reported.

While Anaconda has only limited contractual and regulatory obligations regarding the reclamation of the Jackpile-Paguate Mine, we assume a responsibility to return the site to a state free from unreasonable risk to health and safety.

Recognized scientific experts have determined that the mine, in its present state, has minimal safety concerns. The mine does not have

significant health and safety risks from radioactivity or unsafe movement of pit walls and dump slopes, or air and water contamination.

To mitigate any small remaining risks, Anaconda has proposed a 1985 Multiple Land Use Plan to reclaim the mine site to protect the environment, leave a safe, stable landscape and promote multiple uses of the formerly mined area.

The plan includes development of water resources by constructing a water reservoir in the North Paguate pit area, and Mr. Sanchez is indicating on the aerial photo where that is. This reservoir would provide approximately 1,000 acre feet of storage capacity, and, within a few years, could be -- the water quality would approach the quality of the Rio Paguate. Such watert could be used to support fisheries, irrigation, recreation, wildlife, and livestock watering.

The plan proposes to leave the protore piles and other mineral resources readily accessible for processing. The protore piles are to be removed from the stream channels and are to be sloped to a three to one or flatter and covered with 12 to 18 inches of topsoil and revegetated in place.

The Jackpile and the South Paguate pits would receive limited backfill material. They would be topsoiled and revegetated to provide stable topography and to reduce the chronic water ponding. The total area in these two pits that may result in decreased vegetative productivity would be limited to about 15 acres.

The stream channels would be cleared of dump material for a distance of 50 feet of the stream centerline. This roughly equates to the 100-year flood plain.

All underground entries will be sealed and covered. Dumps with significant risk of erosion to the streams and all dumps interior to the pits will be sloped to three to one or flatter and revegetated.

All improvements will be left for use by the pueblo, and the entire disturbed area will be revegetated, similar to the nondisturbed areas. A detailed design of the plan will be submitted to the record prior to the close of the period for written comments.

While Anaconda willingly proposes reasonable reclamation of the Jackpile-Paguate Mine site, we are critical of the tendency of many people involved in the process to negotiate for money without regard to what reclamation activities that money will be used for or whether those activities are necessary. We at Anaconda are determined to ensure a competent discharge of our obligation and to do this in a cost-effective manner.

We propose the above-described 1985 Multiple Land Use Reclamation Plan and request approval to implement this plan. We resist the unnecessary embellishment of reclamation procedures which do not meet reclamation needs in a cost-effective manner.

Anaconda has carefully examined the scientific and legal basis for reclamation of the Jackpile-Paguate Mine and have concluded that there is no

basis for the pueblo or the department to compel more than minimal reclamation, such as securing the underground openings and fencing the mine to prevent unauthorized entry.

Nevertheless, Anaconda has chosen to offer the 1985 Multiple Land Use Plan, which goes far beyond Anaconda's legal minimum obligations, in order to preserve its reputation as a responsible corporate citizen and foster prompt agreement among the parties on a reclamation plan that can be immediately implemented.

Anaconda Minerals Company has carefully reviewed the Draft Environmental Impact Statement of the Jackpile-Paguate reclamation project and has concluded that the draft EIS must be withdrawn, completely rewritten and published for public comment. Susan Smith, Anaconda's legal counsel, will summarize some of the more important findings of our consultants and address some of the major concerns of the reclamation project. Thank you.

MR. RAMPTON: Thank you, Mr. Sterling. Ms. Smith, you will be followed by Marc Nelson.

MS. SMITH: Good afternoon. I am Susan Alice Smith, an attorney with the law firm of Holland & Hart. We serve as counsel to Anaconda regarding the Jackpile-Paguate reclamation project.

Yesterday, in Albuquerque, I discussed Anaconda's legal obligations with respect to reclamation as well as Anaconda's criticisms of the Draft Environmental Impact Statement.

Since many of you were there, I will not repeat what I said, nor will we present the testimony of the scientists who appeared yesterday. Certainly, some of your neighbors, if you weren't there, will know what we said, and, of course, copies of our statements will be available.

I should mention, though, that Anaconda believes the Draft Environmental Impact Statement contains many errors and must be substantially rewritten before a decision can be made on this project.

Yesterday, I felt the fear, the sadness and the tears of some of your people. Your concerns about reclamation of the mine are genuine. I will speak as plainly as I can to those concerns.

First, radiation. Some fear that radiation from the mine is causing cancer. I believe you when you say your elders are dying of cancer, because nearly one person in five in the United States dies of cancer. But the cancer experienced by your people is not caused by the mine.

Yesterday, two scientists testified about the health effects of radiation from the mine. One was a medical doctor who specializes in the health effects of radiation and who is an internationally regarded expert on that subject. Both men are experts, and, more importantly, both men are honest men.

They said that, given the level of radiation from the mine, there is only a one in 10,000 chance that someone living in the Village of Paguate will die of cancer caused by radiation from the mine, even if they stayed in the

village 24 hours a day for their entire life and consumed meat only from cattle grazed on contaminated soils and vegetation. This means it is extremely unlikely that anyone in Paguate or any other village in the Pueblo of Laguna will die of cancer caused by radiation from the mine. You should lay your fears to rest.

Secondly, the highwalls. You may have heard that the Jackpile highwall will fail. This is not true. All of the highwalls at the mine are and will remain stable. This is the conclusion of a scientist who testified yesterday. He has conducted a very extensive study of the highwall, and, really, of all the highwalls. He is convinced they are stable, and other experts have confirmed his findings.

Also, the risk of someone falling from the highwalls or from a rock falling onto someone, given the fencing that will be in place and given the remote location of, in particular, the Jackpile highwall makes it very unlikely anyone will be hurt from one of those highwalls. The risks from those highwalls are certainly no greater than the risk of natural cliffs in the area.

Third, blast damage. This is not really a reclamation issue, but I will discuss it, because it is so important to some of the people of Paguate. Anaconda hired an expert to study the blast damage at the homes in Paguate. He concluded that the cracks in the homes in Paguate are the natural result of those homes settling, given the age and construction of the homes. Experts from the Bureau of Mines have confirmed this fact. This is the simple truth regarding blast damage in Paguate. It is not the result of Anaconda's blasting. It is just natural conditions.

Fourth, some may believe that the 1985 plan is simply an attempt by Anaconda to abandon its reclamation obligations and to abandon its commitment to the people of Laguna to perform responsible reclamation. It is not. The 1985 plan is based on new information Anaconda has received, indicating that there is no real radiation risk from the mine, and, therefore, much of the material we were planning to move to provide cover over radiological material really does not need to be moved.

The 1985 plan is based on new information we have received, indicating that the Jackpile highwall is stable and, therefore, does not need to be buttressed.

The 1985 plan uses a different and, according to DOI and the Laguna, a better method of shaping the waste dumps. The 1985 utilizes superior methods, really state-of-the-art methods, to control and minimize any ponding that will occur at the mine site.

The 1985 plan adds a water storage reservoir to permit irrigation and livestock watering. Further, like previous proposals, the 1985 plan will completely revegetate the mine site so that it can be used for grazing.

Finally, the 1985 plan keeps the protore waste piles in place to permit easy access for future mine, except for the protore piles near the stream, which will be removed from the 100-year flood plain.

A former governor of the pueblo spoke yesterday about the need for communication and compromise. In order for us to communicate and in order for us to compromise, the pueblo must understand the 1985 Multiple Land Use Reclamation Plan and the science that supports it. We recognize that it has been difficult for the pueblo to gain the technical and scientific support necessary to evaluate Anaconda's scientific information.

We hope that you and your consultants will sit down with the scientists who have worked with Anaconda to prepare the 1985 plan. Only through sitting down, the technical people sitting down, and understanding the basis of the 1985 is compromise a possibility.

Finally, Anaconda believes it is long past time for reclamation at the Jackpile-Paguate Mine site to begin. We stand ready to perform the 1985 Multiple Land Use Reclamation Plan as soon as it is approved. Thank you.

MR. RAMPTON: Thank you, Ms. Smith. Marc Nelson, to be followed by Dr. Ahmed Kooros.

MR. NELSON: My name is Marc Nelson. I am an environmental engineer for Jacobs Engineering Group. I am testifying today on the behalf of the Pueblo of Laguna. I provided testimony in Albuquerque yesterday, but I ran out of time. I would like to summarize the primary comments that I made yesterday and then continue with my testimony.

Yesterday, I testified and provided data and information on the following subjects: First, that the mine site contains serious public health and safety hazards. Secondly, that the mine site is a crucial area to the health and well-being of the Pueblo of Laguna, because the mine site straddles two perennial rivers that are a major source of irrigation water for the pueblo, because the site contains religious sites that are sacred to the pueblo, because the community, the Village of Paguate, is adjacent to the mine site, and because the site was previously used for intensive farming.

I testified that Anaconda failed, during mining operations, to make reasonable provisions for reclamations and that they were required to do so by law. I stated that Anaconda's consultants provided testimony yesterday, and it was in direct conflict with the reports that they had previously provided, some 3,000 pages of reports.

I testified that Anaconda had acknowledged and accepted its reclamation obligations through the many years of mining operations and had made oral and written commitments to the full reclamation of the mine site. Anaconda's newest reclamation plan, in our opinion, is not technically defensible and represents only temporary and partial reclamation of the mine site.

Anaconda has submitted six reclamation plans in the last eight years and have withdrawn five of these plans. The stated reasons for withdrawing these plans, as we heard just a few minutes ago, are not accurate reasons. Those were a summary of the points I made yesterday. I would like to continue with my testimony.

The Department of interior should be commended for the effort put into the draft EIS. The document resolves many of the issues associated with reclamation of the site. However, there are still a number of issues that the department must reevaluate. These issues will be identified in detail in our written comments on the draft EIS, but I would like to hit the most important of these issues at this time.

First, in our opinion, the Department of Interior has underestimated the number of cancer fatalities that would result from the various alternatives. I do commend the department for having Argonne National Laboratory conduct the projection of cancer fatalities. Argonne is the national laboratories that specializes in the biological effects of radiation, and Argonne does not have a vested interest in the outcome of this project.

However, there are a number of issues which Argonne overlooked in its analysis, and a reevaluation of these issues will result in much higher projected cancer fatalities and genetic disorders.

The Argonne report and the draft EIS assume that the regional population will remain static over the next 85 years. This, of course, is not accurate. If even a very low population growth is assumed, the actual number of cancer fatalities associated with the project would be at least 10 perhaps as many as 100 times the number of fatalities identified in the EIS.

The Argonne report does not account for a source term which is continually increasing in size as the radioactive material is disbursed by wind and water erosion. The continually increasing source term should be factored into the projections for the no-action alternative and for any alternative that didn't include adequate stabilization of the mine site.

In addition, the maximally exposed individual, which Anaconda has assumed is a resident of Pagate, is actually someone who might build a home on the mine site. The mine site has two perennial rivers that run through it, and this makes it a very attractive site for people to build homes in the future, and there are no procedures available to prevent this from occurring. So a maximally exposed individual is one who would build a home on the mine site.

Another issue, which is not addressed in the draft EIS, is blast damage to homes in Pagate. Anaconda has prepared a report that states there is no blast damage, but I am afraid the person that prepared that report has a vested interest in the project.

Blasting during mining operations caused significant damage to the homes in Pagate, which are located only a few hundred feet from the mine. Although Anaconda did perform some cosmetic repairs to the damage in the homes during mining operations, such as replacing broken windows and patching cracks, they did not complete the cosmetic repairs, and they did not repair the structural damage done to the homes. This damage, which will cost us a significant amount of money to repair, is a direct result of mining operation and, therefore, should be addressed in this EIS.

The Department of Interior has not effectively resolved the issue of differing projections in the groundwater recovery levels in the open pits. This is an especially critical issue, because failure to properly project

these levels will result in the failure to place a proper amount of backfill in the pits and will thereby result in contaminated water forming ponds on the surface.

The department has apparently accepted the recovery levels projected by Anaconda, but two other studies showed significant and higher recovery levels, and a study performed for the EIS by the U.S. Geological Survey showed that small changes in the input parameters showed large increases in the projected groundwater recovery levels.

Anaconda used liberal input parameters, and the Department of Interior will find that, with the use of appropriate input parameters, a much higher level of groundwater recovery will result. The department needs to put a considerable amount of additional effort in this issue and should explain why the other groundwater recovery projections were not used in the EIS.

The department should also explain how the cutoff wall proposed in Anaconda's Green Book could be effective if it is not keyed into the surrounding rock.

In our opinion, the department has seriously overestimated the long-term stability of the highwalls at the mine site. All of the major highwalls, in our opinion, are unstable, and they are presently in the process of failing. As I discussed yesterday, these are operational highwalls that were not designed for the long-term stability. These 200- to 350-foot highwalls with slopes in excess of 80 percent are very near the Village of Pagate and are a significant public safety hazard.

The highwalls are composed primarily of shale, and the simple use of common sense would show that the highwalls are not stable. If shale had sufficient strength to hold a highwall in place, then there would be many natural cliffs throughout New Mexico composed of shale. However, the facts are that there are no natural cliffs composed of shale in New Mexico, because shale simply does not have sufficient strength to form cliffs.

The Department of Interior prepared calculations which showed that all but one of the highwalls are marginally stable or probably stable, and therefore, they still have a reasonable probability of failure. However, marginally stable highwalls are not acceptable. The highwalls must be reduced in slope until they are stable, not just marginally stable.

In addition, there are several errors in the Department of Interior's calculations. First, the Department of Interior arbitrarily assumed a very high value for the cohesion of the rock units. The actual cohesion of the shale units approaches zero, and this is shown clearly by the extensive amount of sloughing that has occurred, at least in the outer portions of the highwall, since the mine closed just three years ago.

The Department of Interior should recalculate the safety factors using a very low cohesion for the shales and an appropriate cohesion for the sandstone units, and they will find that all the highwalls are unstable.

In addition, all of the calculation of safety factors are based on static, not dynamic conditions. This area of New Mexico commonly experiences very

mild earthquakes. Safety factors under dynamic conditions should also be included in the EIS.

Also, the safety factors calculated by the department do not take into account that the highwalls cut across several drainage channels and that water running down these channels erodes the highwalls and further reduces their stability. Cracks in the rock units caused by blasting should also be factored into these calculations.

Overall, the department has substantially overestimated the stability of the highwalls, and the department should perform a more site-specific analysis on this issue.

In summary of the comments that I made yesterday and those that I provided here today, the Jackpile Mine site contains significant public health and safety hazards which must be eliminated or reduced to an acceptable level during reclamation.

Due to the presence of two perennial rivers at the mine site, the site is extremely susceptible to erosion, and appropriate measures must be taken to ensure that erosion does not cause these health and safety hazards to recur. The reclamation is clearly required by Anaconda's lease terms and the applicable regulations and statutes. This level of reclamation has been required by the Department of Interior and accepted by industry for other mining operations on Indian lands.

Anaconda is not being required to perform a greater level of reclamation than other operators. It just so happens that the proximity of the Jackpile Mine site to a regional groundwater system, a highly populated community, and the two perennial and unstable rivers as well as Anaconda's failure to make reasonable provisions for reclamation during mining operations, make it necessary for Anaconda to perform an extensive amount of reclamation at this time.

Anaconda acknowledged and accepted their reclamation obligations during mining operations and made commitments to full reclamation of the site. Anaconda chose to defer these obligations until mining operations were completed but was caught by the unexpected and rapid decline in the uranium mining industry.

However, this does not release Anaconda from their reclamation obligations. Anaconda must work in good faith within the established regulatory procedures to resolve this project.

The Department of Interior's draft EIS represents significant progress towards a resolution of this project, but it must be revised in a number of areas. Among the revisions required are: A reassessment of the groundwater recovery levels, selecting a preferred alternative that includes provisions for adding backfill to the open pits in the future, should the groundwater recover to a higher level than anticipated; recalculating the health effects to include the increase in population through time as expected for this region and for a continually increasing source term for those alternatives that do not include complete stabilization of the site; requiring the preferred

alternative to include making repairs to the homes in Paguate; and, lastly, recalculating the safety factors for the highwalls, using more accurate and site-specific data and then including measures to reduce the slopes of the highwalls in the preferred alternative. Thank you.

MR. RAMPTON: Thank you. Thank you, Mr. Nelson. Dr. Kooros, to be followed by Mr. Haltom.

DR. KOOROS: Good afternoon, Your Honor, members of the panel, Governor Fernando, ladies and gentlemen.

My name is Ahmed Kooros. I am a member of the staff of the Council of Energy Resource Tribes. Our executive director yesterday, on behalf of 40 Indian Tribes, which constitute about 60 percent of the federally recognized Indian Tribes in the United States, testified on behalf of the plight of the Pueblo of Laguna.

I am here today as a private citizen to voice my concerns on behalf of the land which has been disturbed, which is in tears, and it has not been reclaimed for a number of years.

I am not here today as a specialist, although I can claim to be. Among the things that I had in my past, I was a fellow of the Institute of Mathematical Studies and Social Sciences at Stanford University, but I have grown, as I grow older, to be disenchanted with the statistical designs and the statistical results, for you can in fact draw conclusions from a sample which can give you the most erroneous conclusions.

To that extent, as I have grown older, Your Honor, I would like to talk to you as a human being and not a scientist.

The Council of Energy Resource Tribes is in possession of tremendous skill, and it has been involved with the Pueblo of Laguna's plight and this issue for the last five and a half years, and I have had the honor to be associated with this tribe for the same number of years, and I have learned quite a bit from them.

One of the things that I have learned from them, Your Honor, is that, when they pray, they pray for everybody. They pray for the well-being of humanity, for they believe that their well-being is not independent of the well-being of others.

When they pray, they pray for the safety and security of everybody, for they believe their security and safety is not independent of the safety and security of others.

When they pray, they pray for the good, for the humanity, for the goodness of the humanity as the goodness of the Indian people. Their aspirations are extremely noble. They have attended to their promises of the past, and they require others to fulfill the long-standing promises.

When, yesterday, executive officer Herman Garcia said to the people of Anaconda to swim in those contaminated waters, he did not really mean that people from Anaconda should jump into the lake of North Paguate that Anaconda

is proposing to construct, which would have excellent water, so to speak, in the days' future, he was asking the people of Anaconda to have empathy, to have understanding, to reach out and find out exactly what this group of people have in mind, what were the promises which were made to these people, and fulfill those promises.

When the people of Laguna were told that their land would be repaired, in those days, their repair was the only thing which existed in the dictionary, and the only document that you had was the Webster's Dictionary, and that is a stronger, in fact, statement than the whole question of reclamation.

Now we are coming up with the legal issues of reclamation and minimal amount of reclamation that one has to undertake. All I am saying, Your Honor, is that the people of Anaconda should adhere to the pronouncement of their own leaders, people like Bradshaw, people like Anderson, people like Ralph Cox and others, and attend to their obligations accordingly.

I cannot understand why a statement was made in defense of the 1984 plan -- 81 plan, 82 plan, so-called the Green Book plan, as far as 1984, the latter part of 1984, which was considered to be responsible and technically defensible, and, within a matter of a few months, that defenseability, that responsibility, could turn around, become futile, useless, and what of these scientific discoveries where there are new statistical designs which can give anyone the results that one would want.

Today, those people who used the statistical results don't exactly and precisely realize that prognostications of future events are based on results of the statistics. Statistical designs could not be upheld very easily. The jargon ends -- the statement ends that you can lie through different samples.

As I said, as I grow older, I become more and more disenchanted with that kind of phraseology, and I am appealing to the people of Anaconda to see what their commitments were in those days and respond to those commitments.

I thank you very much, but, in conclusion, I would like to register my views on a number of issues, Your Honor.

I am in support of the EIS process. I am fully appreciative of what the Department of Interior and the BLM task force have done to support the aspirations and the needs of the people of the Pueblo Laguna. I am completely in support of what Governor Fernando said yesterday very emphatically, and I am only asking that Anaconda go back and reread the statements that they have made in the past and fulfill their long-term promises.

I thank you very much for this time, Your Honor.

MR. RAMPTON: Mr. Haltom, followed by Bob Vallejos.

MR. HALTOM: Thank you, very much. Members of the pueblo, my name is B. Reid Haltom. I am lawyer with the law firm of Nordhaus, Haltom, Taylor & Taradash, and we are general counsel to the Pueblo of Laguna.

Yesterday in Albuquerque, my law partner, Les Taylor, went through the specific lease requirements that Anaconda has. Regardless of what Anaconda says about the lease, the requirements are there and the regulations. I want to address some of those and also some additional issues.

Anaconda's current legal position is reflected in the 1985 plan, the plan that I call the sacrifice plan. As has been demonstrated to you today, all they are going to do is build a lake and scrape some of the dirt out of the bottom of the canyons. That's hardly reclamation.

As Ms. Smith, the attorney for Anaconda says, little will be done but create that lake. The cost-effective words that have been used by Anaconda in effect mean cheap. They are going to do the least amount possible for the least amount of money.

Anaconda's position is unsupported by fact, by the leases, by the regulations of the Department of the Interior, and by their course of action through the years.

At the time of cessation of mining activities at the Paguete Mine, Anaconda had three leases. Those leases contained specific provisions requiring protection of the land and the property and also reclamation, although the word reclamation may not have been used.

The lease of March 27, 1952, provides that "The lessee," that is Anaconda, "shall properly surrender and return the premises upon termination of the lease to whomever shall be lawfully entitled to it," and that would be the pueblo, "in as good condition as received, except for ordinary wear and tear and unavoidable accidents from proper use and changes which may be due to proper mining and use of the same under this lease."

Proper mining cannot in any stretch of the legal imagination be read to mean no reclamation. Proper mining includes reclamation. Throughout oil and gas law and mining law that we have known for years in this country, there are implied obligations in the lease terms. Implied in the words proper mining means reclamation. You will not find any other mine in the country where the lessee has gone about its mining activities willie-nillie, without considering the effects of the mine and what the condition of the mine will be when the lease is over.

The leases also require "The lessee to conform and abide by all of the regulations of the Department of the Interior, now or hereafter in force relative to such leases." That provision was restated in the 1963 leases, making reference to all of the leases. Anaconda now claims that this lease applies to that land, and this lease applies to another part of the mine, but no lease applies to all of the mine.

The regulations of the Department of the Interior apply to all of the mine, and Anaconda should be made to live up to the regulations of the Department of Interior.

Finally, the lease requires that "The lessee shall have the right to terminate the lease upon a satisfactory showing to the Secretary of the

Interior and to the pueblo that full provision has been made for conservation and protection of the property."

The word property is key there, because what does property mean? Property may mean the property at the mine. It also may mean the downstream property that is off the mine site that may be contaminated by the activities that took place on the lease premises.

Anaconda, therefore, we submit, has ignored its legal obligations that are in existence in the lease itself. They have tried to read the lease without regard to the expanded definitions that the law allows, in other words, in a contract. It's a clever slight of hand by Holland & Hart, which is a law firm known to be litigants in environmental issues and which have been brought on the scene very lately by Anaconda, presumably to prepare for litigation to challenge the EIS process which is the process by which only reasonable decisions can be made.

We believe that Anaconda has other responsibilities for reclaiming besides what is contained in the leases. In all fairness and economics, Anaconda has profited handsomely, very handsomely, from the operations at the mine site. They refer to the pueblo receiving so much money and to miners receiving so much money.

However, it was Anaconda that received over 600 million dollars in ore value out of that mine. They made a handsome profit on that, and they should have spent some of that money for reclamation as they went along.

To not do so constitutes bad mining practices. Whose responsibility is it, anyway, to reclaim if Anaconda doesn't do it? Anaconda says it's no one's. It's the Laguna's backyard. Let them play there.

I believe that this is out of touch with the representations made by Mr. Anderson of ARCO to the pueblo and others of their good citizen, good neighbor, fair partner's position.

The legal requirements of Anaconda are also contained in other documents and laws that are not discussed in the least. They are contained in the rules and regulations of the Nuclear Regulatory Commission, of the state agencies, and the state EID. That has not been mentioned.

The State Environmental Improvement Division has a responsibility to be sure that downstream people from the mine site are not contaminated by water pollution or air pollution. It's the state that has responsibility for making Anaconda protect those people and their property.

It's also the state's responsibility, because they collected substantial taxes, income taxes and severance taxes, from this land; and the state is required to provide services in exchange for those taxes, and one of the services would be to protect the downstream users, and that would include the cities of Albuquerque, Belen and Socorro.

Finally, if it's not the state's responsibility, then it must be the federal government's responsibility. The Bureau of Indian Affairs is trustee

for all pueblo lands. They are responsible for the conservation and protection of the pueblo lands. The superintendent, under the regulations, cannot release Anaconda until he's satisfied that proper protection of the land and the property is in place.

How does the superintendent know what to do and what to require Anaconda to do? It's the EIS process. That's the process we are going through now. You hear from everyone, and then a reasonable decision is made. Anaconda portends that the EIS process is something new, that this is something that should not be applied to them.

The EIS process comes out of the National Environmental Protection Act which was passed in 1969, 16 years ago. Anaconda cannot, today, in 1985, say that they did not know about NEPA, that they did not know the requirements of NEPA for the last 16 years, because it's been on the books.

The United States of America is also responsible, because it received all of the fruits of the mining activity. All sales originally from the mine were made under Circular V of the Atomic Energy Commission. The mine provided the uranium that was necessary for national defense and was a source of uranium for nuclear testing and study. The Nuclear Regulatory Commission issued a license to Anaconda through the state agency and, therefore, has some responsibility.

The Environmental Protection Agency has visited the mine site and recognized the need for cleanup and the possible health effects to people living near the mine site.

I submit that, like the Love Canal in New York, which many of you may have heard of, if Anaconda does not reclaim this mine, it's going to be the federal government who is going to be left holding the bag to reclaim the mine, while Anaconda carries its bag of money to the bank.

Concerning one other matter which Ms. Smith noted, the incidents of cancer at the Pueblo of Laguna, regardless of what her experts may say, is according to the villagers of Paguate and others, higher than the national average, and I believe that, if they were to make a proper survey of all of the people on the reservation, they would find that there are significant side effects that are affecting the people of the Pueblo of Laguna and the Village of Paguate, and that matter has not been studied.

Experts can do a lot in their laboratories, but it doesn't tell the whole story, and I would encourage the EIS process to not disregard the health effects and the mining effects on the Village of Paguate. Thank you, very much.

MR. RAMPTON: Thank you, Mr. Haltom. Mr. Vallejos, to be followed by Rachel Garviso. I would like to state at this time that if any of you wish to present your statement in your native tongue, the Tribe has provided an interpreter, Delfino Begay, who will interpret your remarks. So merely make that request, and Mr. Begay will be available.

MR. VALLEJOS: Mr. Chairman, members of the panel, ladies and gentlemen, good afternoon. My name is Bobby Vallejos. I am the vice chairman on the

board of trustees of the Seboyeta Land Grant. I am here to represent the people of the Seboyeta Land Grant.

Since this hearing has a president and all, a panel, draft EIS, I would like to point out for the record that this does not consist of one Indian, one Hispanic. This is unfair.

I have some experience in underground mining, strip mining, reclamation. 15 years, to be exact. I have done some work for Exxon, United Nuclear, Sohio, Kerr-McGee, and a little bit with Anaconda.

First, I would like to comment about the mentioning of the Rio Moquino. From some of the Moquino speakers of Anaconda at yesterday's hearing, it is very ironic how you can compile stacks and stacks of data and information and not contact one single person across the fence meaning the community of Seboyeta, which is only five miles away from the pit. It makes you wonder why. Maybe I represent the people in the community where I live.

In 1961, Mr. Louis Jaramillo sued Anaconda Company for damages done by blasting operation at their mine site at Jackpile. Mr. Jaramillo won it in District Court. Anaconda appealed it to the state. The State Supreme Court handed down a final decree ruling in favor of Mr. Jaramillo. They handed down quite a considerable amount of funds.

Anaconda has never gone back to talk to anybody in the Village of Moquino. The walls that still remained in all the houses, churches, buildings, Anaconda tried to prove -- they brought a seismograph machine for detecting vibration caused by explosions.

They tried putting it on the wooden floor of Mr. Jaramillo. Mr. Jaramillo hired an engineer and proved Anaconda wrong. They made Anaconda put that machine on the walls, and they recorded a different reading, a much higher reading. I can get you copies of the court proceedings when I contact my attorney.

I would like to add that, in my personal experience with uranium and oil producers, contractors, I have nothing too good to comment about their reclamations, their reclamation efforts in the area. They have performed very shabby work, and United Nuclear, it was a snow job. It is nothing but gullies. The therapy used is Mancos shale. They say they are going to get topsoil. They have to start a complete new mine to get all the topsoil to put it back.

That Mancos shale does not work. All it grows is ragweed, tumbleweed, and they don't hold the erosion. In other words, nothing but gullies, and there's room in there at United Nuclear, St. Anthony Mine. They have never come back since they picked up their gear and left. They have never bothered to contact the board. They did a salvage operation. They have never communicated with us. I sympathize with the people from the Village of Paguate.

I have to wake up every morning and look at Gavalon Mesa. It remains nothing but a disaster site. When time goes by, you will be able to graze on those hillsides. They have made no efforts to rehabilitate the people. They dropped us like hot potatoes. This includes all the uranium companies in the area.

We are presently involved in a suit with Sohio over water rights, over water pollution from their seepage from their tailing ponds onto the other side of the fence. Sohio has presented a deal for us to give them a buffer zone in the exchange for rocks on top of the mountain, which we can't use.

United Nuclear has two more years on a contract with us. They have offered to buy us out and leave, give us one lump sum and get out. They have made no efforts to contact any of the board or the people of Seboyeta to do any reclamation work.

Anaconda talks about building a reservoir. What about the water rights? Aren't all these water rights all appropriated by the state already? What about the wildlife when all this contaminated water -- what's going to happen to the wildlife?

Another thing. What are the chances for a nuclear attack now that all these buildings, mines, open mines, mills, exist? It used to be zero. Now, on a scale from one to 10, I would say there's nine chances. In case of a nuclear attack, they are going to get to the source. Get rid of the mines, mills, so they cannot build no more bombs.

We are placed in a danger zone. Our groundwater has been polluted. It's been proven by one of the state agencies that pollution is moving at a rate of 75 feet per year or something like that. I am not sure on that statistics, but it has been proven that it's moving in towards the land grant from the milling operations at Sohio.

The Department of Interior should take these problems into consideration and, finally, make a final decision in the draft EIS. This should be a very important fact. Thank you.

MR. RAMPTON: Thank you, Mr. Vallejos. Rachel Garviso, followed by Herman Garcia.

MS. GARVISO: Good afternoon, panel and ladies and gentlemen. My name is Rachel Garviso, and I am from the Village of Seama, and I am also a member of the Pueblo of Laguna.

Yesterday, I attended the meeting in Albuquerque, and I have heard the speakers stand before us that have all kinds of degrees. You name it, and they have the degrees of all kinds. I am not a well-educated person, and I do not have any kind of a degree. I am just another human being. A person can have all the education and have many degrees, but it can also be applied to common sense and experience.

How many of these people with the degrees have been near or live near where a mine is in progress? My people, especially the Paguate people, have lived near the mine since it started and are still living there near the open pits. They have actually experienced what a blasting of mine can do to the earth and their homes and to have their homes filled with smoke and dust, breathe in all that, 24 hours a day, sleeping or awake. Yet some of these people say there is very little effect or none at all.

I have said this before, and I will say it again here. I still believe it has affected the health of my people. In the past, my people have passed on at the age of 100 or more. In the past two or three months, we have been burying my people every week or every other week. Some of these people you actually know and seen, and who are still very active.

The next thing you know, so and so is in the hospital. So and so expired. Then you ask why. Why did that happen? The physicians say cancer or heart attack.

So you wonder where this sickness and the illness has come from. None of this had been among my people in the past. So there must be some reason my people are dying right after another.

Also, about these highwalls at the mines, they tell us that it's stable, and it's going to stay stable for a long time. How many of these people have been out east when a tornado hits, uproots the tree trunks as big as -- they can be in the houses.

We don't have that around here, but we do have high wind and rain, and the floods come after that; and how long those highwalls would stand against these rain and wind damages, I don't think anybody can assure us how long that thing is going to stay there and how long it's going to stand without crumbling down. And they tell us there is no danger that this -- of this thing, but I think there is.

There is danger in all these things, when you look at it, because you live on this reservation, and you know what it's like.

Another thing I would like to say is: White people make laws, rules, regulations and promises, and, most of the time, these things are broken, more often by the same people than the others. I would say there is a phrase, what the white man say, "Indians talk with a forked tongue." I think that this should be reversed around at this point, because Anaconda does not want to fulfill their promise and obligation to the Pueblo of Laguna. Anaconda has promised the Pueblo of Laguna, when the mine closes, that he will make the land back to what it was before the mine started, which we now know the land will never be the same as it was in the past.

In my last statement, what I want to say, Anaconda -- I want Anaconda to fulfill the promise he has made at the beginning, when the land was leased, not after, many years when he has changed everything. A promise is a promise, and it should never be changed. It should be kept. Thank you.

MR. RAMPTON: Thank you, Mrs. Garviso. Orlando C. Romero. No, wait a minute. Herman Garcia, to be followed by Orlando C. Romero.

MR. GARCIA: Good afternoon, Your Honor, panel, tribal members. I made a statement last night, and my whole intent of that swim was just simply to more or less prove to me to show how safe the water is. I didn't mean it in any other way or to hurt anybody's feelings, and I don't think I was out of line, and I don't want anybody to feel offended by that.

But while I am here, and according to the test, very little hazards exist. Little or no radiation at all, and, like I said last night, I am not an expert, and I cannot really argue that to the fullest. I am going by my experience and common sense.

Referring to the blast damages over in Paguate, I don't argue the fact that the buildings are old, but I can tell you one thing. The buildings were well-maintained throughout the years, and just to show you more or less, they took a very good harsh beating for 20, 30 years, and they withstood all the blast damage, all the blast damages that came about later.

More or less what I am saying: The buildings were well constructed to take that kind of beating. All right. Anaconda did repair homes, which has proven to be very unsatisfactory. They are not holding up.

Then, again, he has made a \$300,000 goodwill gesture for me to repair the homes. How he came up with that figure, I don't know. When he told us in the past that he has spent over three million dollars to repair those homes, then how am I expected to redo the whole works with \$300,000? That is the only point that I question.

Another thing, too, is maybe some of you have never been in the Village of Paguate when the blasting was going on, but you have an eerie feeling when you experience something like that, and I think the people that have received extensive damages are being affected psychologically, because I have heard several people tell me sometimes they hear a crack at night. I guess that's when the cracks are expanding. I don't know. I am just assuming.

I feel that no other research in the area of cancer has really ever been conducted here on the Laguna Reservation, not only in Paguate. There is a 10-year-old girl which happens to be my nephew's daughter who has been affected by cancer, and it's terrible to see a child go through this.

That is the reason why I think we feel very little concern has been shown or expressed in certain areas, and yet we consider this our major concern. We, as tribal officials, are put here for a purpose, to protect the welfare, the well-being, of our people on the Laguna Reservation.

And we do value people's lives. They are as human as anybody else, and I think their concerns need to be considered more strongly, not just pushed aside like as if though it was yesterday's newspaper or something like that.

All right. Anaconda spent millions to pay tribal employees. What bearing does it have? When you are in business to make money, you have to pay something, especially if you are looking towards profit. I don't see what bearing it has towards our reclamation.

All right. What Mrs. Garviso said earlier is very true. Commitments prior to the lease. The 1953 -- prior to 1953, before the lease was made official, a lot of commitments were made, promises, commitments by both parties. One of them was Anaconda was to use mostly tribal employees, so that's about that money question you have brought into the picture.

Another thing, too. To restore the land to almost its natural contour and natural service, that was one of them. He didn't say how many millions it was going to require, and there was no mention of putting in a recreation area. That was what I am hearing today. I am not planning to go into that type of business, because I strongly feel the hazards are still there. Until I can be assured of that very strongly and convince, then I will not, in the future, consider something like that.

This Anaconda's new plan, somebody called it sacrifice plan. Well, I more or less go along with that, and also you can call it a guinea pig plan, because we are going to set a precedent for the whole world. That is the protection, I feel, towards these big mining companies, and I think you, as people, should be more concerned about people's lives, their health and well being, not how to save money for big companies. I think that's what it boils down to.

And I think some kind of research should be done on the past commitments, agreements and so forth which came about prior to 1953. Why they were never incorporated into the lease or contract, that is why I have to argue. I was here, and it hurts me, when I see almost a blank contract.

At that time, my feeling was Anaconda's obligations weren't limited. But, at that time, no such thing was mentioned. Now he's stating that there are limited reclamation obligations and so forth.

Okay. Blast damages in Paguate. A study has been conducted over there, because we were dissatisfied with Anaconda study that Anaconda presented, and, at this time, I don't have anything to report, but you will be forthcoming when the study is conducted.

And my only wish and dream is that we get started on this reclamation to eliminate all health hazards. Like I mentioned, and need I mention again, I value the people that put me here, and all I am doing is trying to at least solve their dissatisfactions and what is bothering or ailing. That is our job.

So, with this thought in mind, I hope we can come to some kind of a resolution to resolve our reclamation problem. That is our main concern. We are not trying to get Anaconda for as much money as we possibly could for self-gain or anything like that. But we also want flexibility. We want enough money to do a proper job to eliminate all the health hazards or whatever.

I don't know. When you see a rock on the edge of a high cliff, how stable they are, not unless they are glued or something, I don't know. I have to disagree, because I see this. I go by there almost every day. Now, I see these type of things. They are remainders from the past. That's all I have to say. Thank you.

MR. RAMPTON: Thank you, Mr. Garcia. Orlando C. Romero, followed by Lloyd Dailey.

MR. ROMERO: Panel, the governor and ladies and gentlemen, you are going to be a bit surprised, because I don't have any education, either, like Mrs. Garviso said. I speak plain English, no education at all.

It seems to me like all these oil companies, uranium companies, they are owned by the British, Japanese -- oh, yes, the other ones. The Middle East. They have taken the money out of here. Some of these companies is 88 percent, they own by people outside of the United States. 88 percent. 12 percent is from United States.

This is a challenge for you people that you can take to your government, to your senators, if you can speak with them. You can tell your senators that if they -- they can go ahead and repair Anaconda and the rest of the mines, send the bill to Japan and send the bill to the British, and send the -- because the British is the one that started killing the Indians and the Mexicans when they first came over here. But, believe me, I am not a Mexican. My name is Orlando Romero, and that's just what I am, nothing else.

I went to Santa Fe and talked to somebody. I am not going to tell you who, the environment -- some people in the environment who are getting \$35,000 a year from the mine companies, getting paid. So are they for us? Really, think about it. Are they for us, the environment? No, they are not. They are for the bosses. The good old American men that was talked about, oh, a couple of weeks ago, I guess. They say that -- what was his name? President Reagan? Mr. Lujan made a statement that he was an all-American man.

Well, let's see that American man defend the American people. Pass the bill to whoever makes the profits, Anaconda, these people here that are representing Anaconda, but they are hiding under the law, because that's the law, and the laws were made for the foreign countries but not for the people of the United States.

It seems like, every time something happened, it gets put on the Indians. Blame it on the Indians. The Indians is a pain in the neck, but they never tell you about the people that come from the Middle East and demand that the welfare department gives them money, because that's their law.

Some people from the Middle East come over here and have three, four, five refrigerators and one breaks, and they have the welfare repair them. Do they repair it for the Indians or the Mexicans? No. They don't. Oh, we are spending all the money.

It never gives me -- I feel like two cents a lot of times, thinking of -- it's education setting us back how far. I really -- don't take me wrong. I believe in education. I got four children, and all four of them went to college. I believe on it.

But they don't have the common sense that, after we treat these people the way we did -- oh, I go down to the bars. I go down to the store. Here comes a dirty Indian. But we aren't dirtier than them. Is it fair that somebody like this -- I seen this lawyer over here just a while ago. When she first started getting up over here on the place where I am at now, she was a beautiful woman.

By the time she got out of here, her face was red. I think she has only been here one day and is already getting taken care of, the uranium. But when she got out of here, she had blotches all over her face.

And for my buddy over here on the side, I also notice he's from -- I think it was Grants, because I don't even -- I only been here for eight years, so I don't know too much about here. However, I am a descendant from here.

I noticed that, when all the people from Anaconda were talking over here, they were writing everything that they said, but when the lawyer from the Indians was talking, the other gentlemen that talked over here that was a professor, once in a while -- I believe he was writing little horses, I guess. I don't know. I don't know what the hell he was writing. And he's supposed to be the president. What kind of a president we got.

Okay. I guess, if you want to call me Mexican, go ahead. School didn't teach you nothing, because my name is Orlando Romero, and I am an American, grandpa, great-grandpa. My father, me, my son, we all went to war for the United States. So I am an American, the same kind as any one of you over here.

They were also talking about the buildings in Pagate. Well, that's funny. All the buildings in Seboyeta and Moquino -- the water in Moquino has been contaminated, and the buildings in Bibos are coming apart, the churches. We are repairing one church now. If you want to go see it, you are welcome to it, because the walls are coming apart.

I don't say they did it, but I know the mines did it. If they didn't -- they didn't do it. No. He was sitting in his office. Like I said before, he's got to protect the interest of the company, which is the British. Hey, we ain't got nothing to say. But they protect it under the laws of the United States. However, Mr. President, if you can get over to me, and if you can have me in the White House, I will talk to him. I will talk to the Congressmen. I will talk to anybody, telling them where they are at.

There's a joke that -- I am going to close now so I won't bore you to death. There's a little joke. In Phoenix, Arizona, there's a crazy house at 24th and Van Buren, and this guy, who is an Okie from Oklahoma, he was driving a truck, and one of his wheels fell off.

Then another guy from inside of the fence came over, and he said, "What's the matter? Why are you scratching your head?"

"Oh," he said, "Well, the wheel fell off and went way over there on the other side of the street. What am I going to do?"

He says, "That's easy. Get a jack. Jack up your truck. Get one lock on each wheel. Put them on. Then you go on your way, but don't forget to get the jack down on that truck, because you are going to break your truck."

And the guy looked to the north of Van Buren, and he says, "Incidentally, why do they got you here?"

"Oh, no, Mister. They got me here because I am crazy, but not stupid," Thank you, very much.

MR. RAMPTON: Thank you, Mr. Romero. Lloyd Dailey, followed by Dorothy Purley.

MR. DAILEY: Good afternoon panel, gentlemen, ladies. My name is Lloyd Dailey. I reside in the Village of Paguate. I am also a Laguna member. Yesterday, I was kind of brief on the statement that I made, but I wasn't really that clear of what I made. But reclamation was the key issue for the Village of Paguate and also for an entire people of Laguna but also our neighbors, Seboyeta, Bibos, Moquino.

It's been far too long that nothing has been done to reclaim the mine site. I feel that, if I was to disturb your lands with the man-made crater that exists today, I am pretty sure that you wouldn't like it. You almost wanted to see it the same way it once was.

It's also been stated that Anaconda was to agree to backfill the open pit area which was mined out. Today, nothing has been done or agreed upon by both Anaconda and the Pueblo of Laguna.

What is it going to take for you, Anaconda, to understand that the people are in demand to have something done about the mined-out areas? To my understanding, I feel that you, Anaconda, don't care about the health of our people. I believe we have lost enough people due to exposure of bad air and radiation that comes from the mined-out areas, as I stated yesterday.

As you sit down to the dinner table, that blasting that had occurred, the film that was once in the air, still exists in the Village of Paguate, and even in the morning, you could see steam, light-type of air that's coming out of the vent. Now, tell me, radiation does not exist?

Now that we are exposed to radiation, put yourself in our place. If you were to live in a community like the one we are living in today, I am pretty sure you wouldn't want to live in an area like this.

It was stressed that some of our sacred shrines were disturbed due to the mining operation. If I was to tamper with your church or organization where you do your worshipping, you would not like it. I feel that we, the Laguna people, do a lot of praying, not only for ourselves but the entire people throughout the word. This is why it is very important of how we feel of our sacred places that were once destroyed by the mining operation.

Remember, we are all U.S. citizens. Then why don't you treat us equal, or is it because we are plain, dumb Indians that you treat us this way?

Now, I ask you: Think of the lives of our Laguna people. Thank you.

MR. RAMPTON: Thank you, Mr. Dailey. We will hear from Dorothy Purley, and then we will have a short recess. After the recess, we will hear from Felicita Pacheco.

MS. PURLEY: Good afternoon, everybody. I am Dorothy Purley, and I was one of the speakers down at the Convention Center. I want to state what I said yesterday. After everybody speak, and it seemed everybody had a degree of some kind, I only stood there holding a piece of yellow paper that said cancer, reclamation, blast damages to homes in Paguate. Who is responsible? Anaconda is responsible for all this.

I want to ask, if reclamation should occur, what guarantees does Anaconda have to give to us? What does our grandchildren have in their future if they should start vegetation that is edible to eat? How do we know it's safe to eat? How do we know that our livestock are safe after we butcher to eat it, for Anaconda to tell me?

And right now, I feel I am mad. It hurts living in Paguate, day after day, constantly seeing the face, the looks, what Mother Nature had put there for us to see. Mother Nature didn't put there for white men to destroy.

I also stated white men has a slogan saying, "Keep American beautiful and clean." Then why does Anaconda want to do this to us?

I lost my mother. I lost a brother who worked for Anaconda. Sometimes I say, could it be what is floating in the air? Look at it. Mr. Reagan has cancer. Could it be some of the dust that flew clear into Washington? I wonder, because we don't know how the wind carries the pollution.

They say it goes a long way, and I am glad that some of my people have stood up, braved it to stand here to tell white men how we feel. It's true. We Indians are always been put down, and yet we were first to be here. White people should be thankful that the Indians were the ones that came here.

Come on, Mr. Anaconda, give heart. Feel sorry for my people. I have an old man who is almost 93. I often wonder, what does he have in store? I am having complications. Could it be what I am breathing? Could it be what I have eaten in the past that was flown by the dust that came towards our way?

Boy, you people don't know what we went through, bouncing up and down, running out each time the siren went off. It was just like, you might say, picture when Vietnam War was going on. Thank you.

MR. RAMPTON: Thank you, Mrs. Purley. This hearing will be in recess for 15 minutes. We will reconvene at five minutes after 3:00. (Recess taken)

MR. RAMPTON: This hearing will come to order. Would everyone take their seats, please? Our next speaker is Lawrence Pacheco, followed by Rita Romero.

MR. PACHECO: Good afternoon, gentlemen. I just want to go back to the time when Anaconda first discovered the uranium mining at Paguate. This was back in 1953 or 52, and at that time, when Anaconda came in, they had a meeting with out tribal officials here in Laguna, and at that time, Anaconda agreed to reclaim the land as it disturbed it. Now it refuses. Anaconda does not want to live up to its commitments.

Back then, Professor Fitch, Dr. John Herndon, they told the council that they were going to reclaim the land. All right. They reclaimed one at the northeast end of the mine. We replanted it. I say we, because I worked over there on that field. They planted the chamisa that grows around here which our sheep and cattle eat. It grew pretty good, pretty nice, but even the horses weren't eating. Nothing would eat it. It still was there.

We gathered seeds from up around Concha Valley, but somehow the animals is smarter than we are. He knows what is good.

And all the land that is now destroyed; all that little valley at one time was planted in fields of corn, alfalfa, beans, little garden patches, and the people lived off the land.

Now, I looked out my kitchen window, and I am a resident of Paguate. I forgot to tell you. My name is Lawrence Pacheco. I live in Paguate out at the southeast end of the village, and I can look out my kitchen window and see devastation of what Anaconda left.

It's just like somebody digging in your backyard and leaving all of the trash and dirt. I don't think many of you people would like that, but that's exactly what Anaconda done to me.

They tell me -- like I said, the people lived off of that land, and they tell me that the blasting had nothing to do with the destroying of homes. How many hundreds of years have those buildings stood in the weather, rain and everything else, and yet they never cracked. They never fell down.

I can show you some of the places that the buildings came down during the height of the blasting. At one time, the governor even had to tell Anaconda to cut down on its blasting because of the ruins of the houses, and they did.

But, still, they tell me they had the little Geiger counters set up on the east end of the village, but the blasting wasn't the cause of the cracks on the houses, but I know different. I lived there in Paguate. I have lived there all my life. And nothing like that has ever happened, until the blasting started.

They tell me there's water under the buildings. I live right on top of a rock. I have only about two feet of dirt, and then the rest is rock. I don't know how deep it is, but that's as far as I can dig, two feet of dirt. Some of those houses on the southeast end right above the cliff are set right on solid rock, and that -- that hurts. You can feel it passing you whenever you are there.

Then, again, the dirt from the piles that got there, the sheep -- there's a man that has a little flock of sheep wandering on the eastern edge just a few miles, maybe not two or three miles from the Jackpile Mine. Those sheep, when the wind blew -- when the blasting occurred, the wind blew to the east. The sheep were sneezing, coughing, and you could see them wandering on the ground, on the grass that grew on the land for us.

And the houses that Anaconda fixed, I disagree with them many times, because they were not fixed right. We went over the houses time and again, trying to fix them, but they never held, and to date, some of those houses, the roofs, especially, that we fixed are still leaking. What little rain we get, it comes right through, because some of the dirt that we took off -- there were all dirt, all pulverized, just fine sand. Towards the end of the mine work, when the blasting occurred, you could feel that dirt, pulverized dirt, come from the ceiling into our kitchen tables.

I don't know what they mean when they say that they are going to fix up the land where it can be used again. Now, we know what's under there. Like I said before, the land was used, and it fed the people. Now we know what's underneath the land there.

How do we know if we -- if we planted, how do we know that those plants are not going to be contaminated?

We have lost the land for good. I don't think it can be used again, so, with this in my eye -- and, then, again, since the blasting -- where Anaconda made those drill holes right up against the rocks south of Paguate, we used to have springs where we could get water. Now those springs are all dry. There's nothing, nothing but places where there used to be springs. There's no more water.

Everything has gone down underneath. Everything has been contaminated. They told us not to use that water going down the creek, because it wasn't fit for man or beast. How could it not go down past Mesita Brook? I don't know, but they say the water -- or the contamination doesn't reach Mesita Brook. But how can it, not with the water, especially during rainy seasons, when we have high water, and that's not very often. But it could go down to Rio Puerco.

All in all, I believe that Anaconda has the responsibility to take care of the people in Paguate, because, since Anaconda merged with Atlantic Richfield, nobody seems to care what happens to us. Nobody seems to want to listen to us, to sit down and talk and hear our side of the story.

We have repeatedly, many times -- since this reclamation business, EIS has come aboard. Like I said, since Anaconda merged with Atlantic Richfield, nobody cares how we get along, when we do.

Like I said, right on top of that mine, there's a -- like I said, I live right on top of that mine, and there's a big rock in the middle of the mine, and when the wind comes from the east real hard, you can see that dust. When it rains or when it snows in the wintertime, you can see spots where it's hot and where it's warm. The snow melts right there, and you can see, and those vents, they still have them in the hillside there south of Paguate.

In the wintertime, you can see steam coming out of those vents. Now, tell me, is that not radiation? Is that not some poisonous gas that comes out of those holes? I don't know. The white man comes around with his little gadgets there and tells me, "Now, watch here."

But I know, because I live in Paguate. I lived there all my life. I lived there a few years, a couple of three years after the mine started, and I worked there since, and I know the work of Anaconda, and I know how those houses are fixed.

I think Anaconda should at least look at me and say, "What have I done to you?" What do you mean? Nothing like that now. That's why we are still crying. That's why we are asking for help. Help my people, reclaim the land, cover those poisonous water holes up.

At one time, they suggested, one of those holes with water, fish be put in it. How do you know that water is not contaminated? How do we know the fish would be good to eat if we fished in there? All that water is contaminated now downstream. Take a close look.

Thank you very much.

MR. RAMPTON: Thank you, Mr. Pacheco. Rita Romero, followed by Clarence Acoya.

MS. ROMERO: Your Honor, gentlemen of the panel, ladies and gentlemen, I just wish to make a statement about Anaconda's blasting and the damages it has done to our homes. I was at the meeting yesterday, too, and I have heard people, different people, say it can't be the blasting. It can't be the radiation that's causing our problems, but I believe it is.

I hate to say -- I can't call you liars, or maybe it's just that I believe that they are the cause of these things. My people have complained about cracks in their homes. I am not complaining about a crack in my home. My home was completely destroyed.

Right now, I have no home. I am living in a rented house, and this house I am living in isn't even livable. One side of it is all beginning to deteriorate because of the damages, I guess. The ceiling is falling in.

And I feel that it should -- something should be done about it. It is to my belief that Anaconda had promised to build us or rebuild us our homes, and I have got a blueprint at my house to show that they did really promise us that, as to no avail. Nothing has ever been done.

I am not asking for anything, because I am getting old, but I am speaking for the younger generation and for my grandchildren. I just want to say I humbly beg of Anaconda to do something for my people. This is all I have to say. Thank you.

MR. RAMPTON: Thank you, Mrs. Romero. Clarence Acoya, followed by Elmer Hunt.

MR. ACOYA: Members of the panel, last night, I attended a meeting in Albuquerque. It appeared that many of the speakers were very much in favor of the reclamation, and the sooner the better. I believe that, if we could cover those holes up, it would be a lot safer from the health standpoint as well as the safety hazards involved.

Despite the fact that Ms. Smith underplayed the hazards of the area, the reality is that there's contamination out there. Health hazards or hazards caused by decaying of elements continue every day. We breathe -- we drink the water and so forth. How much of that we have not yet been told is harmful at this particular point.

The safety hazards involve the rock falls, landslides and possibly colliding or collapsing of underground outlets. These are some of the things that perhaps have not been seen to the point where you have actually experienced that by not being in the area or by not going out to the mine itself. Those are very possible hazards that could be death-causing.

I agree with David Lester, who alluded to several areas of, quote, "issues dropped from further evaluation," stated in the Environmental Impact Statement. And I don't know why that EIS dropped these issues simply because, number one, I think it all is very important and related to the mine out here and are some of the hazards or some of the things that we are concerned about today.

These are seven of them, and they are expressed in page 18 in this book. I don't know how many people have it, but I think, if you could read through this and somewhat formulate in your own mind that these are very related issues -- and that should be one of the -- some of the concerns of the group that is going to be putting the proposals together so that the mine could be reclaimed.

I feel that, on top of that, as an example -- this is very related -- investigate the possible health impact that mining operations had on former miners and residents of Paguete. This is so closely related that you can't sever that, and EIS says this is not a point, and I beg to disagree with that.

Last night -- Mr. Garcia, who is a staff officer from Paguete, when he spoke this afternoon, stated that there were five deaths from cancer last year in Paguete. This alone is a very big factor and accounts for an investigation, and things like this should not be let go.

Also, I think the other point is, in terms of the issue, there should be monitoring of health impact to the workers performing the reclamation and post-reclamation work.

Under chapter three of the report, or this statement, it states that, out of the average background radiation of 100 milligrams -- millirems, excuse me, per year, it would result in an estimated life-shortening of eight days.

Now, if I could guess this correctly, and correct me if I am wrong, that it would take -- every 46 years, a person has lost at least one year of his life or her life.

Now, on the other hand, there is another issue that comes up. In the statement, it says that there are no federal or state regulations governing radiation exposure to workers involved in surface mining or reclamation activities. This accounts for the fact that, if we don't have that, certainly somebody ought to be very concerned. Perhaps the group that is getting together to drop these proposals should come up and state to congress that we need some laws that will govern this type of thing. Also, the state legislature should do something about this.

About three weeks ago or maybe a month ago, there was an issue in the paper concerning some Navajo mine workers, and they were trying to get a recourse to their health situation, but they can't do anything with it, simply because of the dislack of the law.

Statistically, in the table, 1-3 of this same book, there's a summary of reclamation alternatives. These alternatives -- for example, as I went through, there are 86 items of reclamation -- items of reclamation that dealt with as to how the whole process is going to be taken care of.

Laguna agrees with 34 items of these 86, which is around 40 percent of that. While it agrees with the Department of Interior on 30 items or about 35 percent, and these issues -- or these items include all the way from pit bottoms to reclamation cost estimates.

Now, I think if there's some agreement, at this particular point, on some of these items, then I think it's a good start to begin somewhere or to begin here. Perhaps this is what the panel wants to hear, or you want to hear.

And in studying through at least parts of this statement, I think it's very clear that everybody wants to do something about it, whether you are an Anaconda Company person, a Laguna member, or whether you are a federal person. I don't think it really matters. I think we are all interested in getting something done.

In the average cost proposals -- there were three of them -- and the average is approximately 55.7 million dollars. That is money to do the reclaiming. If there was an average taken, that would be, perhaps, a good point to agree to or agree at.

Also, the man-hours of labor. We are talking about 202.6 years, average, and it's very little difference in that particular area. So this means that -- also, the monitoring. One says three. One says five. One says 10. And it averages around about six years, at least in my viewpoint. I think that these are some of the things that we need to come to some kind of conclusion to in terms of where to agree and where to compromise.

I think, the sooner we can agree and compromise, coming up with a good proposal or a good plan, we can begin to live at least feeling that our health is much safer and the hazards have been taken care of to a point.

Thank you very much, sir.

MR. RAMPTON: Thank you, Mr. Acoya. Elmer Hunt, followed by Larry Garcia.

MR. HUNT: Good afternoon. My name is Elmer Hunt. I am a member of the Laguna Tribe. I served with the tribal counsel for 11 years. During that time, we had negotiations with Anaconda, a second renegotiation. Always it was implied that reclamation was a key project, that this would come about when the program had ended.

You know, Indians are very trusting soles. With that in mind, we trusted Anaconda with what they told us. Their words to me were trustworthy. But somehow or other, we could never get Anaconda to document these promises or the things that was presented to my people.

We argued over many points during negotiation, and our counsel did their best, our consultants, our lawyers, and now we are at this point where we have to again fight for survival, you might say.

Anaconda treated us fairly in a business sense, and I question now whether they meant that this was part of reclamation. I agreed and heard many things about the physical being, environment and so forth, and there is real danger there, and we must reclaim that land. When I say we, I mean the company. I mean the United States Government. I mean the Laguna people. We have to demand that this land be reclaimed.

I am a proud American and a proud Indian. I fought and served the country, our country, for 20 years, and I feel that it is only fair that we, all of us that are Americans, treat each other like we speak of, that we are

so proud of, that our government is so proud of, that the military industrial complex turn and help us out.

There are real hazards out there, my friends. Who knows what's going to happen in the future on the groundwater, underground water, the surface water? What's going to happen 20, 50 years down the road when Belen, El Paso and the great state of Texas starts to fight us? I feel that this responsibility shall be and must be the burden of Anaconda and the United States Government, who is our father, as the Indians have always been told.

We expect a good job out there. There are many things that can be said and many things have been said, and for those things that might sound drastic, they are true, my friends, for those people that live at Pagate, for those people that live up the road at Bibos, at Seboyeta. They know what it is about.

When blasting was done, when hauling was going on, I worked out there. My responsibility was to water the roads, haul water to the mine. Five miles up the hill on Black Mesa, when a blast went off, that water would slosh and jump around inside of those trucks, so you cannot tell me that, 50 yards away from the blasting, that those homes in Pagate did not get damaged.

Certainly, Anaconda tried to repair them. They did patch jobs. Once a structure is damaged, my friends, you cannot patch it and make it last. You have to rebuild it. We must demand, we, the Lagunas, the councillors, demand that those homes be rebuilt.

Not only was that damaged, but the physical, psychological, mental problems. There were plenty of them there, my friends. If you live there day after day and smell and breathe the dust, you know what I am talking about. Those men that work there, who knows what our children are going to suffer from then, down the road. I feel very sincere in asking the company and the United States Government to come to our help, and let's restore that land like it was promised.

I really feel that the United States Government should realize that it is their job to help us to restore our land. We provided the resources when they needed it. We gave the company the ability to take out the resource, and it saved our nation. And who knows? That resource may still be needed in the future. Maybe this is just a beginning.

As you can read and hear and see, the nations around the world are still using uranium, and they will continue to use uranium, and we still don't know what the hazards are from this. Sometimes you might call it wonderful resource, and then, again, maybe it isn't.

I went through several blasts when I was stationed at Kirtland. We dropped the terrible A-bomb and also the H-bomb in the Pacific and in Nevada, and I have seen the damage it can do. So what lies under there in Pagate or in any other community might be not all that good for us.

I wanted to make sure that all of us understood that this is a serious matter, and I implore our council and the people and the panel that represents the United States Government to come and do the things that is their

obligation, not only for a reclamation, but to be held responsible in the future for whatever might happen from the water, from the sand, the dust, and the -- and everything that is out there, not only at Paguete, but in other places, because we are all Americans, and we can suffer the consequences.

Thank you.

MR. RAMPTON: Thank you, Mr. Hunt. Larry Garcia, followed by Wil Lente.

MR. GARCIA: Good afternoon, Mr. Chairperson and panel. My statement this afternoon is not based on a two-week or a short period of time of testing or checking out the place, but a 13-year period of time, being employed there on the powder crew and the drilling department. It was my job to oversee the blasting department and the drilling. It was my job to make sure that the walls, the tables, the benches that we had to place our drills and powder crew on were stable and safe to do all the work.

From day to day, looking at that, I have to, without any hard feelings, disagree with Anaconda saying that there is no pollution of the water or the air and that the highwalls are stable. I would like to voice my concern on the very small part of the whole concern that is upon my heart, but I would like to address the highwalls especially.

The highwalls are not stable. They are constantly undermined by deterioration from the rains, the snow and the high wind that come across the Gavelon Mesa. On the Gavelon Mesa, at the very top, the cover -- there is a layer of hard rock there that covers probably 8 to 10, 12 feet thick. It's not solid all the way across. The whole thing is in blocks, probably something from 8- to 15-foot chunks like this.

As far as cohesion is concerned, there isn't any cohesion between those rocks, because, when we go through and drill and blast -- and the back blast -- the back break brings out very clearly that there are just blocks of rock in it. The roots are in there from the grass and whatnot, and it just -- when it vibrates a little bit, you know, there's cracks there, all the way down to the bottom, and right under the layer of these hard rocks, this black shale.

When that shale dries up, it just crumbles, and a blast -- the wind, the rains, begin to deteriorate that, and it starts to fall on its own, which will leave an overhang.

Now, looking at that, during the blast time of my job there, you cannot see it. That's why, when the folks, the people that have been over there inspecting and checking it out -- you can't see that right off. But if you are there every day for years after years, you see that, when you blast, right, they are right out there in the open, and many times, we couldn't fragmentate those rocks down to the right size for the dump trucks to carry, because you just can't. They just fall over from the top.

But that's not the only place where this is like that. There is some over by P-10 area. But my concern is over there at Gavelon Mesa, and those highwalls are like that, and if anybody can go over there and check and scrape the top off far back enough, you will find that it's just like that all the way back.

There isn't anything solid; and a few years will go by, and you go back to inspect it. You won't -- it will look all right, but after several years, rains and whatnot, the wind blowing up against it -- if you have -- you know where I am talking about, the Gavelon Mesa.

Take, for example, the mesa is here. The mine is on this site. The blasting and whatnot, the highwalls are on this side, facing the direction of the wind, and it will, over a period of time, undercave, and there will be an overburden, and it not being solid all the way back, it will begin to fall in.

I have another concern about the sumps that are on the hillsides from the exploration drilling. Many of those have been plugged, I understand. Now, the sumps that were drilled -- there are holes that were drilled where the drills would bring up the cuttings in water, and some of those are bladed over and all that.

But how much of that is contaminated with the ore and whatnot that has been brought from the bottom? How many of those holes are left open to where livestock might, you know, get a foot in there and broken?

The Rio Paguete River that came down through just below the Paguete Village was rechanneled in order to get the ore out from under the original river, and I believe that, as the years go by, that water, by seepage, will again find its original route, and that water, we know, comes down -- down into San Jose and whatnot.

If there isn't any water that flows on top on the surface, coming down to what we call Mesita Dam and then on down into Rio Puerco and whatnot, there are understreams that flow there. If anybody wanted to check one out for sure, south of the main gate used to be -- on the east side of the railroad, there is a place there that caved in. There is a fence around it. Right now, if anybody wanted to check it out, it's an understream, and that stream, I know, came down through the Jackpile Mine.

The dust, I don't know how anybody can say that there wasn't any pollution in the air. We tried to blast when the wind was blowing hard so that it could blow everything towards east, but we know that some of it went down towards into the Albuquerque area.

Now, I think Albuquerque should be concerned about air pollution. But when the days -- when the wind was blowing west or on calm days and when we blasted all that smoke, like you have already heard before, it just gently came upon the Village of Paguete, lingered there until it settled down to the ground.

The vibration effects on all of Paguete through the blasting, it was my job to hold down the size of the blasts over in the Paguete area and, to the best of our efforts, we did. But we know that it still vibrated. If you wanted to check, there is a diked vein that goes right up into the middle of the village coming from the south side.

You can see it. It's visible, and that goes right down into the blast area into P-10 area and the open pit, the underground, both, and we know that, if you bumped up against that rock, it could have vibrated, wherever it goes. It's a long vein.

There is a vein that we see just going over the overpass here going down the hill that may be part of that vein that goes all the way. It looks like it is, because you see it here and there, but it shows up very clearly on the south side of the Village of Paguate.

Any time anything bumps up into that, if there is an air blast or a vibration through the ground, it hits that. It's got to travel on its vein.

So there was, and I would like to say, without any hard feelings to the Anaconda people, pollution of air and whatnot. My intentions was not to hurt anybody but just facts, and I would like to say what I have stated is facts, because we walked over those for 13 years. I had to look over the edge. I had to make sure that there was no undermining of where we were going to drill next, and we had to get blades and cats to push off the top part, and when you did, the cracks were there. Thank you.

MR. RAMPTON: Thank you, Mr. Garcia. Wil Lente, followed by Walter Arkie.

MR. LENTE: Good afternoon, ladies and gentlemen. Members of the panel, judge, I would like to make a statement, actually, a couple, as a matter of fact. My name is Wil Lente, and I am a tribal member from the Village of Paguate. I, too, was employed by Anaconda from 1969 to the first big layoff in 1981. The structural damage in the homes in Paguate, Your Honor, I have some pictures here that I would like to enter as evidence.

MR. RAMPTON: All right. This packet of pictures, then, will be Exhibit 5, I believe, and will accompany the record and be made a part of it. (Exhibit 5 marked)

MR. LENTE: Okay. The structure damage on the homes in Paguate. Anaconda says that the damages are not the result of the blasting during the mining activity, but we, the residents of Paguate, believe that this is -- that this is true, because -- for this reason: Before the company started any mining activity, there was no walls cracking in the homes or never ever heard of any resident of Paguate complaining of this sort.

The homes were beautiful and well taken care of, compared to what some of them look like today. I think some of the residents got so tired and frustrated about mending their homes, it was probably like putting a Band-Aid over a bandage.

Prior to this, there was no disturbance of the land the houses were built on. When mining operations started in North Paguate as well as South Paguate, due to the depth of the mining in both areas, water was driven out from beneath the village, thus creating lands to settle, shift and twist, thus causing the homes to start falling apart, even though they were not a direct impact of the blasting, also causing natural wells to dry out, such as the one over by the Rodriguezes' residence, south of Paguate Village, southwest of the big bridge.

Anaconda says they are not responsible for damages on the homes, but, by the mere fact that the company allowed working crews to go into the village to do minor repairs on homes, which was insufficient, this admission is enough to say that they have a moral obligation to try to fix up the damage they created.

I, too, am a veteran of war, the unpopular one, as everybody knows it to be a dumb war. The days when running off to Canada or parts of the country unknown was the "in" thing. The days when all these righteous, so-called patriotic Americans spit at me, called me every name in the book and condemned me for wearing a Marine uniform.

What's the point in all this? The point is: I was abandoned by my own so-called American people then, and I am being abandoned by -- I am being abandoned again, now, this time by Anaconda. Yes, I fought an unpopular war, to keep my America clean and free from communist aggression, so people like you, Anaconda, and the other big companies can be free to make a killing while you are making millions of dollars without being interrupted by any war.

That whole war in Paguate is like a wound, and it's a constant reminder of my own comrade, torn apart by war, and that I am trying to put him back together. I can humble myself once more and ask you to help me put my fallen comrade back together again, because I can't do it alone. Don't prevent me now. Don't abandon me and my people at a time of need. Don't spit at me and walk away. You have a moral obligation as well as a social.

The Multiple Land Use Reclamation Plan that was introduced by Anaconda in August, which I, myself, consider not good enough, the advantages which is in the plan, such as irrigation, fishery, livestock watering and recreation -- the risks of making North Paguate into a reservoir for fishing and recreational area is out of the question because of the instability of the highwalls.

I mean, can you see some of the people having a Sunday afternoon picnic under a highwall, knowing at any time some of those boulders could come down crashing on them and actually living to tell the rest of us about it? Besides, I doubt that any fish can survive in the contaminated waters. Well, maybe piranhas can.

As far as livestock watering is concerned, no livestock owner in his right mind will water what he owns there. As a farmer, I won't water my crops with that water for fear every plant will die out on me.

The studies done on the rate of cancer deaths is really something I can't agree with. Within the last two years, two to three years, the staff of officers from Paguate -- this uncle died from cancer. My partner in council, stepfather, died from cancer. My mother also died of cancer, and that was confirmed by a doctor at St. Joseph Hospital.

There are at least two more that also died of cancer, and they are all from Paguate. This business of two to three cancer deaths every 90 years is outrageous. Now, the President can sign off on a bill of 25 billion dollars supporting foreign aid for the next four years. Why not use some of that tax payers' money for some of these studies for health impact? After all, Indians are tax payers, too.

And so let's face it. We don't want a recreational resort area. We want the hope built back up. In conclusion, it's true. I am no expert, and I don't have a degree as a Ph.D. or an engineer or the sort, but I do have enough common sense and the wisdom to know and recognize the disadvantages and dangers of your so-called reclamation plan. Thank you.

MR. RAMPTON: Thank you, Mr. Lente. Walter Arkie, followed by John Pino.

MR. ARKIE: Good afternoon, panel, ladies and gentlemen. I am Walter Arkie. I am a tribal member from the Village of Paguate. I am a former employee of Anaconda, until the layoff, and my comments today, I would like for the reclamation of Anaconda mining to be started as soon as possible because of health hazards and also the repair of the homes that were damaged by Anaconda from the blasting.

It don't look bad for the outsiders, but for the Laguna Indians that live in the Village of Paguate, next to the mine where more damage was done and felt, it don't look good for us. At least Anaconda could have the common sense and decency to repair the damage done and to refill the land -- refill the land that is causing health hazards as they promised in the contracts signed with the Tribe.

In summary, I would like to make a plea for Anaconda to do something about the reclamation, as us Lagunas are American citizens and would like to enjoy good health as long as we can. Thank you.

MR. RAMPTON: Thank you, Mr. Arkie. John Pino, followed by Martin Kowemy.

MR. PINO: Panel and representatives, professors, lawyers and tribal administration and my people, you might bear with me. I might once in a while talk to my people in my language. I am sorry I didn't get anybody to write my speech. I would say, I don't have no degree. I am not a professor. I am just a poor, old, cheap worker on the Laguna Reservation.

The governor yesterday presented a true statement. It came from 1952. When Anaconda released the ore on the reservation, he released the whole reservation, the whole reservation. They gave it to Anaconda. "Okay. Anaconda, the reservation is yours." But the old folk, we have some real old consulate. When they sit down, they don't just say yes. They ask questions.

The first mine south of here was a crack pot. In a few years, Anaconda find out Jackpile was the main vein of the war. They sat down the old -- this is where I put my mind, right here. "This much of the land, I am going to take."

And the Paguate people realized, "We are giving that Jackpile, but no farther west. You cannot go far as Seboyeta Creek, on west of that, no, because we have our places, a sacred shrine that cannot be disturbed."

They said, "All right. I will mine in Jackpile." It lasted 15 years. Anaconda realized it. The uranium at Jackpile was going to pay up. It came to the Tribe again.

I wanted to correct the two days you were just talking about Jackpile. Jackpile is itself, and Paguate Mine is itself. Jackpile was agreed with Anaconda first, and then a second time, an agreement was made for the Paguate Mine.

When Anaconda realized it, it came back to the Tribe. All the land west of the -- "I want the land west of the Jackpile."

All right. Let's take it back to the Paguate people. And the Paguate people said, "No. Jackpile was the only one we agreed, no further west."

So the Bureau of Affairs, Anaconda and the tribal administration was against the wall with the Paguate people. But some smart -- some smart people say, "Do it in white man's way. Let the people vote." Well, it was done that way, and my Paguate was defeated. The Paguate Mine started.

All the Paguate people objected, but the tribal administration agreed with Anaconda. So what it was agreed, the old consulate managed to get out of it. I want to say this: I am sure there was appointment. We don't have John Herndon and Albert Fitch, Jack Mailer, Jack Saber, or Frank Owen. Those were the people always coming to the tribal administration. When they agree -- the old man asked John Herndon and Albert Fitch, "When you get through with the mine and dig a hole, what are you going to do?"

"We will come back and fill it -- drill that hole, make it the way it is, make it better, looking grand. We will plant grass, instead of tumbleweed. We will even bring some pine trees from Mt. Taylor."

This is what my Paguate people have here in mind today. Those holes be filled. New vegetation planted. When you hear them say Ha, that means yes, and when you hear Za, that means no; so you here that Ha. That's the word they want.

So, on behalf of our people, we all thought yesterday, when we went down, the picture there -- and I thought they had one before, and then after -- and our people thought that was funny. They thought they were going to hear it. "This is what we are going to do? This is the way we are going to fill the land."

But, no, a lot of -- a few minutes ago, I made a statement. A lot of documents. "Well, we are bringing a lot of paper." A lot of paper and documents. Enough paper the state made to fill all those holes, I say to myself. One thing I wanted to say. I seen this. I thank you.

When we make agreement with our friend, our friendly people, we never realized there are always a law. There are always a catch behind the statement, even though Anaconda really put in writing a verbal agreement to fill it up. But today, yesterday and today, I hear all kinds of laws, so I ask Lagunas. One thing I wanted to say. I want this land made reclamation. We don't have no word for Laguna reclamation. All we say, fill the hole. That's what we say. I don't want this to go on like my neighbor, Navajos and Hopis. I want for the land.

I want this thing to be settled. All we want to know is when. Not how, but when. That's what my people are anxious to hear. When are they going to start? Not how, but when. This is the statement I want, and I will say again, Laguna has always an agreement with the highway, agreement with the gas company. One of the most valuable agreement was a railroad agreement, and ask tribal to ignore it. It was the purchase agreement that old folks made back in the 1890s, somewheres along in there.

I want this thing to go on record. You, my governor, and tribal administration and Bureau of Indian Affairs, the lawyers, I want my tribal

administration to take out the agreement with the railroad, see what ARCO and the railroad people would offer me for running their railroads through my reservation without no compensation.

I want this to go on the record, and I want -- having to come here like today and tell me what they are going to promise me. Brothers on the team and people, the things we have talked about yesterday and today I hope will benefit us all in a favorable people. Thank you.

MR. RAMPTON: I asked Mr. Begay to come forward and just give a translation on the brief remarks that were given in the native tongue.

MR. BEGAY: Thank you, Your Honor. In continuing to render assistance to the hearing proceedings, the governor has asked that I interpret that portion of John Pino's remarks and comments so that they will be entered into the permanent record.

As I indicated to the hearing board yesterday, my name is Delfino Begay. I am also a member of the Pueblo of Laguna. The comments made by Mr. John Pino, at this point were four or five points.

First of all, he mentioned in his native tongue and asked the general public, the membership of the Pueblo of Laguna, do we understand the purpose and the proceedings of this meeting? Do we realize the magnitude of the situation at hand? We have been aware of activities, the mining activities, since we entered into agreement with the companies back in 52 and 53.

Now that the mining activities have stopped, we are confronted with a grave problem. It is mandatory that all efforts be made by the responsible parties to resolve the issues and proceed with reclamation.

For the record, he asked an open question to the general membership that are present in this group here, and he ascertained: Is it not a fact that these commitments and agreements entered into by these parties, namely, the Pueblo of Laguna, Anaconda Copper Company, at that time -- it not a fact that we stand ready and hold fast to those commitments and agreements that these efforts, these problems that we are confronted with, should be resolved and that reclamation should take place? As you heard from the general membership here that are present, the comment or response was yes.

These basically are the remarks made by Mr. John Pino, who spoke in his native tongue, and I was asked by the governor that these should be interpreted and entered as part of the record.

Thank you, Your Honor.

MR. RAMPTON: Thank you, Mr. Begay. Martin Kowemy, and he will be followed by Conrad Lucero, who is the last person present who has indicated a will to participate.

MR. KOWEMY: Governor, panel, ladies and gentlemen. There's a lot of things that's already said. I am going to say -- but I am going to say it again. When Anaconda was still in operation and the blasting was going on, and there was -- Anaconda was trying to repair these homes during the blasting that was going on. A lot of these repairs can't be made stable because of the blasting, day in and day out.

They cannot be made stable because some of them aren't done right or maybe because of the material that Anaconda had put up. Maybe they are not of the grade that they should be used for some -- I was there when they were repairing them. I was with them. I was with the repairmen, so I know. I know what they were doing.

Sometimes they don't repair the houses like they should, and now, even though they had good supervising -- I grant that. They had good supervision, but I don't know why they were left not even in the good repair. Now that mine has shut down. Blasting is not going on.

Anaconda, I think it's time for now that -- to go on all-out repairs now and make these houses' repairs done right and stabilized. In a lot of these houses, I don't think they were -- some of them are. Some of them not even repaired at all. I don't think they were. Some of them were, but they didn't stay up. Anybody can see those houses. Some of them aren't even repaired, or they haven't really been done.

So I think the only thing that's left, I guess, is that Anaconda should repair these houses, and, of course, a lot of things are already mentioned.

Highwalls. Highwalls, already mentioned. Anaconda tells us that they are really stable, and now Jacobs Engineering is telling us different. They are telling us it's not even stable because of that shale that's under there. It's crumbling. Even the man that's doing the blasting was just telling us a while ago that -- he also said that shale is crumbling underneath.

So who are we to believe that engineer of Anaconda? I think engineer did lot of study. I am quite sure of that.

Marc Nelson will just say that highwalls aren't stable, because of the water -- I mean, the rain, torrential rains and snow and even wind, somebody said a while ago, that's making these highwalls weaken. So I believe that these highwalls should at least come down or something.

I don't think anybody in their right mind would go over there and swim in that water. That's contaminated, or even have a picnic under that highwall. I doubt that very much.

Now, you've heard of the eastern part of the United States where they have open pit coal mines. You've heard they have been reclaimed. But why are we going to be left out? Is it because we, Pueblo Indians, are considered at the bottom of the totem pole? Is it they are not going to do anything for us? Let's at least have a heart and do something for us here.

Anaconda personnel was asked in Albuquerque last night -- I think it was by John Deloris -- if they know Jack Naboles. Did they know Albert Fitch or Harry Alexander, who used to make agreements with -- most of these agreements were verbal. Some of these weren't even in writing. They were verbal. What do these people know what agreements we had made at that time? We had made some agreements about this open-pit mining to be secured or reclaimed.

I have other things to say, but I don't think I will. I will give somebody else a chance to say something. So, in Albuquerque, too, somebody

mentioned we should keep America beautiful. This Jackpile and open pit mine is a far cry from being beautiful. It's an eyesore. Thank you.

MR. RAMPTON: Thank you, Mr. Kowemy. Conrad Lucero, and after he gives his presentation, we will be in recess until this evening at 7:00 p.m.

MR. LUCERO: Panel, people from the Anaconda Company, the general public of the pueblo, friends of the pueblo, today, I guess, is a prime example of what a resounding boom would sound like.

It bothers me to find that only three people I see from Anaconda here. Where are the others? That shows me that you are taking the attitude that you can get up and walk away from it, because this is not your land. This is my land. I have to live with it.

Yes, I worked there. My father worked there. My brother worked there. Where does it stop? It doesn't. Somebody would question the statement of Governor Fernando last night in saying thousands of pueblo members worked there. Over a period of 29 years, there can be thousands of pueblo members. Some still here, some gone. Technically speaking, neither I or the members of my tribe, a very few, maybe, can speak with authority on the technical data that's been submitted by the company.

But I think that one approach that has long been left out is to take the common-sense approach on any of the issues involving the mine itself. experiences with the workings of the mine, with the progress of the mine, and finally the decline in the uranium market.

I hear that daily blast once again from the people. You, Anaconda, are not hearing it. You did not hear it. Those of you that are here were not there when they went off. If any of the management people came out there, they were gone by the time the blast went off.

We talked about downstream contamination. I come from the Village of Mesita. The reservoir directly south of the mine has many names, Puerco Dam, Mesita Dam, and others, probably. It was a primary source of mine irrigation waters. Anaconda tells me, through their technical people, that dam, the siltation there is not contaminated. That siltation may not be contaminated, but it has taken away an area for reserve, for irrigation waters for the Village of Mesita. No one from Anaconda can tell me that it does not have a direct effect on the people downstream. Gentlemen, it does.

Blasting has been a major portion of what's been spoke about today, but I think, if you look at it, in a common-sense attitude, again, technically, Anaconda is saying, "No, the blasting did not damage the homes."

But, again, getting back to the common sense, common sense tells you, when you remove a part of something that has been permanent, especially with the effects of the blast, you weaken the structure. The effects may not be felt today, but they will be felt, and they are being felt, right still today.

We talk about how far the groundwater is going to recover, how far back up. Can hydrologists tell me exactly? I am sure they can. They can only calculate it. They can only make a calculated guess. Again, looking at sections, models, computers, one will never know. The groundwater that is

ponding right now is on the increase. The mine operation has a direct effect on the lives of these people you see here. That's why it bothers me so much that those people from Anaconda that were present at last night's hearing are not here today.

The direct effect I am talking about with regard to the homes in Paguate. Okay. Seismograph machines will tell you how far a blast travels, and we have been told time and time again how far it will go. Two milliseconds per whatever, foot. But the minute you took away the face of that mesa, you begin to dewater that area. You begin to deplete the groundwater that helps to stabilize, that helps to give that cohesion to the material, sandstone, shale, whatever it may be. You dry that out. What do you have? You have got a drying-out effect.

Take a small pond, anywhere. When it dries up, what happens? You begin to see a cupping effect, just from the siltation or whatever that's in the base of that pond. Exactly the same thing that's happening here, drying out. It's dried out.

How can, then, not an area be damaged? I talked to one person some time ago, not specifically dealing with reclamation but dealing with another matter, and I thought that I had, in my own mind, a clear understanding of what I was going to do, and the question after I had explained myself was: What did you use? Did you use rationale, or did you use common sense? And I thought I had the answers by telling him I used rationale.

He says, "I am sorry. You can rationalize until you get to the point where you think you are correct. Try the common-sense approach," he said, "and you will find that common sense will tell you a heck of a lot more than trying to rationalize."

I implore Anaconda to use some common sense. Put yourselves in my place, in my people's place. Put yourself in the homes of those in Paguate, 30 years, and hear that resounding boom day in and day out, morning and noon, night. What kind of feeling would you have?

You have opened a wound. Unless you can take it to a doctor to get it repaired or you know how to do it yourself, that wound is going to stay open. That's exactly what you have done. You have wounded my mother, because, as an Indian, I have different values of land than you, the white man, do.

Your value is dollars. My value is far deeper. It comes from the heart. Use your mother as an example, because tradition and custom that I have been taught by my elders have told me, that is your mother. Take into consideration if a wound was opened on your mother somewhere, face disfigured, dismembered, by an act of man. Again, you, the Anglo people, have a different perspective of how to repair it. All you ask is: What is it going to cost me to repair my mother? You don't, a lot of times, think: Is she ever going to be of sound mind, of sound body?

It angers me to have to sit here and listen to the technical data. Whether it's to impress me, whether it's to overwhelm me, whether it's considerably stupid, because I can't understand it, that's for you to figure

out. But I think my people have common sense enough to realize what they want and what they need.

The multiple land use proposal, it was explained to us, could be used as a recreational area. At the same time, they are saying, with it fenced in and access controlled, no one will get hurt. What is the idea behind it? You are telling me you are going to fence it off, but yet you are telling me to use it as a recreation area. What are you trying to do? What are you telling me you are going to do?

I think one of the best phrases that can be coined out of the proceedings last night and today is: Come and swim in my pool. Are you ready to do that, Anaconda? Are your technical people ready to do that and be able to do it day after day after day, year after year?

The DEIS process -- the EIS process, I should say, has brought a number of issues to light, but yet we, the Pueblo of Laguna, continue to bring other points out. But gentlemen of the panel well know that, and I don't need to repeat those again. You know what they are.

If we can take a little time, stop, think, and again use common sense, let's not rationalize. I think the technical people have rationalized to the point that everyone else feels they are correct and everyone else is wrong. It's gotten to the point where neither I or the majority of my people can keep up with the volumes and volumes of technical data that's been handed to us, even the DEIS.

You have heard today that my people don't fully understand the content of it. Why? Because they don't have the working papers that go along with formulating such a document. These are the kind of things that I think we all need to think about. These are the kinds of things that I think we need to make each other aware of.

But I implore, again, Anaconda, would you walk away from your mother and leave her to die? Let's use that approach, because, again, the ground I stand on, the land I live on, the land I reap some benefits from, not nearly the extent that you did, is my mother, and she provided me, but now it's time for you to repair my mother.

It's time for you to mend that wound. You be the doctor and make me and my people happy with a sound reclamation project, not the sacrifice that you are throwing at me. Can you honestly say to yourself that the land -- the Multiple Land Use Reclamation Plan is the best when you've in the past submitted, withdrawn, submitted, withdrawn, a number of plans that far exceeded what you are planning to do right now that you want us to swallow? That's just too big a lump for me to swallow, and I will not swallow it.

MR. RAMPTON: Mr. Lucero, could you conclude, then, in about ten seconds?

MR. LUCERO: 15.

I basically said what I need to say, but, in summary, the voices that you heard today, consider those the blasts that you set off day after day for 30 years and live with it within yourself. Thank you.

MR. RAMPTON: Thank you, Mr. Lucero. We have one other gentleman who desires to speak, and I think we can squeeze him in prior to the recess. Mr. Henry Anaya.

MR. ANAYA: Anaconda, ladies and gentlemen, I am just going to make a short speech. I am not a politician who probably always makes long speeches. I am a resident of Pagate, and I always have been in charge of the damaged housing in Pagate, and Mr. Bazer Ward, he was working for Anaconda, and he was in charge of the housing in Pagate, and like Anaconda says, blasting is not the one that done the damage.

Yes, it does. It shakes. All the Pagate people know, and I have been to every house in Pagate that I know. There's some, when you go inside, some corners, they are about that much cracked. You can see it from inside, the light, outside. Of course, there's some people that have -- their houses are down. Just like a while ago, I heard Mrs. Rita Romero. Her house is down. There's no more there.

One day, she came. She talked to me, and she said, "I want you to call Mr. Ward. Send a machine over so he can clear that wall out." There were two walls down, and she had big logs on there.

I said, "Okay." I said, "I will call Mr. Ward at the Jackpile."

Then he sent the machine out to clean that wall out. Now her son's got the house, and there's another house, next to the post office, that's clear down by shaking it. It's down now. And some of the houses -- and there is some houses that -- her name was Lucia Lucero. She lived on the other side of Pagate Village.

Inside, it's cracked. They put some workers on the inside there, but it didn't do any good. It still cracked.

Ward had a crew, about four or five men, working for Anaconda. They were from here. They were from Old Laguna, working at those houses, and again there's one house on the west side of Pagate Village across the wash. We call that Chinatown. I don't know why they call it that. The house, it's on hills, on top. I don't know if Mr. Pete Aragon is here or not. His house -- he called me one day. There were about three or four more weeks where Anaconda finished working.

So Mr. Ward and I went over there. We went inside and saw firsthand inside, and you can see the light from inside outside, and there were about three more weeks. Anaconda was going to finish a job, and they said, "It's going to take one month or maybe more -- it's going to take over a month to finish that. We almost finished it," he said. So we let that go. I don't know how it is. Outside, they prop it up like that. They have a board holding the wall up now, right today.

Okay. And then Pagate paid some money for the crews, somewhere. Then I was in charge again. Okay. We were taking the wall down on a barn, or it's loose, so nobody could get hurt. Right today, some of those houses loose, leaking, today, right today.

And Anaconda says it's not the blasting. Yes, it does. And it shakes. I have been inside the homes, and they are cracked. Paguate people knows. Every one of them know it shakes. I know that. I seen it. I worked, what, two, three years for Anaconda in charge of the houses' damage, and I know. I have been to every house, even the barn. Of course, it doesn't take care of the barn, just the housing.

Again, there's three people came out to me and said, "We don't supposed to pay the house material, just the labor?"

"Okay. I will find out." I said, "I will talk to them."

So I talked to Ward. "You find out, and maybe there's some document, some kind of agreement, that Anaconda made we don't supposed to pay for it."

Okay. About two days, he called me just before quitting time. He said, "Are you going to be at your home, your house, this evening?"

I said, "Yes."

"I am coming over to see you," he said.

I said, "Okay." So he came. We sat down at my house there, and he says, "I couldn't find any kind of agreement that Anaconda made that you don't have to pay the material but just the labor," you see.

I don't know whether he did try and look for it or not. I don't know. He works for Anaconda. When you work for some company, you are going to be for it all the time. I work for contract, and you got to be for somebody that you work for.

So he didn't find anything, but that was three persons that told me that we don't supposed to pay any material but the labor. So this house that I am talking about, across the wash, still cracked. It's still that way.

And this is about all I am going to say. Thank you.

MR. RAMPTON: Thank you, Mr. Anaya. This hearing will be in recess until 7:00 pm. (Recess taken)

MR. RAMPTON: This hearing will come to order. My name is John Rampton. I am administrative law judge for the Department of the Interior. I have been asked to chair this proceeding. The members of the panel who will receive your comments are Mike Pool, the Environmental Impact Statement team leader; Bill Allen, to his right, area environmental protection specialist; and John Andrews, the EIS technical coordinator.

The purpose of this hearing is to receive your comments on the Draft Environmental Impact Statement for the Jackpile-Paguate proposal, and we have heard from the members of the Anaconda group in Albuquerque yesterday, and then we have heard the comments given today in the afternoon session.

We will give everyone an opportunity to speak their wishes. We only ask that you try to limit your presentation to 10 minutes, insofar as possible.

If you exceed 10 minutes, I will give you some type of signal so that you can summarize, and make sure that you say everything that you wish. So far, we don't have too many signed up for this evening session, and we are scheduled to go for as long as necessary. So if anyone is present who hasn't signed up to speak and wishes to, you can step to the table at the rear of the auditorium, fill out a card, and we will take you in order.

If there is anyone present who wishes to speak in their native tongue, the Tribe has furnished a translator, Delfino Begay, who will interpret your remarks into English for the record.

Now, it's important that everything that is said here is transcribed correctly by the reporter; therefore, we can only hear from one person at a time. I can't think of anything else at the moment. If there is anyone here who doesn't fully understand the ground rules, you can raise your hand, and we will answer any questions that you may have. Yes.

MR. HALTOM: Mr. Rampton, my name is Bill Haltom. I am the attorney for the Pueblo of Laguna. I would like to make a request, if I could. I don't know if it will be out of line or not, but that's presumably why you are here.

I was concerned this afternoon when you were taking testimony that perhaps some of the people in the audience didn't have a very good grasp of the matter contained in the gray book, which is in front of you and which you are taking testimony on. That's the Draft Environmental Impact Statement.

I would like to ask that maybe Mr. Pool or one of the other members of the team give a five-minute or 10-minute overview as to what is in that document and what is not in that document so that the audience will have a better idea of where the Department of the Interior is with its environmental impact process at this time.

MR. RAMPTON: Do we have a volunteer?

MR. POOL: Do we have to?

MR. RAMPTON: Actually, no. This draft environmental statement was prepared, I guess, February, 1985. The comment period has been from March the 6th and remains open until October the 4th.

So, if there is anyone here who has not had an opportunity to examine this, copies are available from Mike Pool, and you can submit written comments until October 4th for the benefit of the people who are preparing this draft environmental statement and who will issue a final EIS.

So I guess that's outside the scope of these proceedings, to have any explanation by members of the panel. They are here to receive comments, not to answer questions. They may, if they desire, ask questions for clarification purposes only, and it has to be assumed that, at the moment, their minds are not made up. They are still considering all the alternative proposals, all of the comments, before they issue the final statement.

So any questions that they may ask of any witness should not be preconceived or thought of as a preconceived stand on their part. They are

still evaluating all the proposals, and their minds should not at this point be made up.

But I am sorry, Mr. Haltom. I can't, unless one of the panel members wanted to volunteer, accede to that request.

Are there any other questions?

The first speaker tonight will be Governor Chester T. Fernando, and he will be followed by Martin Tsiosdia. I apologize for my lack of familiarity with the names that might appear. Governor Fernando.

MR. FERNANDO: Thank you, Judge Rampton. The panel, people in the audience, I am Chester T. Fernando, Governor of the Pueblo of Laguna. I appreciate the opportunity to appear and express the pueblo's concerns regarding the reclamation of the Jackpile-Paguate Mine.

The pueblo is anxious for Atlantic Richfield Company, also known as ARCO, through its subsidiary Anaconda Minerals Company, to begin reclamation and fulfill its legal obligations to the pueblo and the United States. It is outrageous that there has been no effort since the mine closed in 1982 to even mitigate the most obvious health hazards.

Before I go into my testimony, I would like to make a few rebuttals regarding the statements that Sue Smith made. Sue Smith, legal counsel for Anaconda Minerals, assured us that the homes in Paguate were not damaged due to blasting, and the damages came about because of the structures.

I object to that statement for the simple reason that I question, if such is the case, why, then, do the same type of structures at Chaco Canyon, Mesa Verde, Bandalier Monument still pretty much hold on to its existing structures?

The members of the pueblo, she also assured us, were not to fear radiation and other contamination. I have some questions regarding this. I question why Anaconda employees immediately vacated the premises regarding the residents that were located on the mine site, even prior to the closing of the mines. How many of the consultants and technicians of the company would be willing to build a house for their families on this site and live there for the rest of their lives, drink from these reservoirs, farm on these lands, with very little or no reclamation at all?

Those are the concerns and questions that I have. I would like to proceed along with my testimony.

On October 18th, 1951, the Pueblo of Laguna granted the Anaconda Company, now a wholly-owned subsidiary of Atlantic Richfield Company, an exclusive uranium prospecting permit covering substantial portions of the lands of the Pueblo of Laguna. Consistent with the procedure at that time, the permit extended the exclusive option to lease.

During 29 years of operation, over 400 million tons of material were removed from the three open pits and several underground mines. The ore mined had a value to Anaconda in excess of 600 million dollars, on which substantial profits were made.

Thousands of members of the pueblo worked for Anaconda during the 29 years of operation, but today only about 200 of them have qualified for company pensions that are inadequate, and most exist at the poverty level with no health insurance.

It is unfortunate that Anaconda did not adequately provide for its employees and their families. These people who gave their lives to the mining operation feel abandoned.

This may be beside the point of reclamation, but, as governor, I recognize how they may feel as though they have been treated unfairly. This is particularly true of the people from Paguate Village, which overlooks the mine site, serving as a constant reminder of their hard work and Anaconda's failure to clean up the mine site.

Upon cessation of mining operations, as of March 31st, 1982, Anaconda had three leases with the Pueblo of Laguna, covering a total of approximately 7,900 acres. The Jackpile-Paguate Mine is not only the oldest open pit uranium mine in the world, it is the largest open pit uranium mine in the United States, and it has not been reclaimed.

Approximately 50 percent of the residents of the State of New Mexico live within a 50-mile radius of the mine. This includes the Albuquerque metropolitan area and the City of Grants. The mine straddles the Rio Paguate and the Rio Moquino, which eventually flows into the Rio Puerco and eventually the Rio Grande River.

As can be seen, the environmental effects of the unreclaimed mine touched the lives and property of a substantial portion of the state's 1.3 million residents. This is why the total reclamation, satisfactory to the federal government, the pueblo and all affected citizens of the State of New Mexico is essential.

Of the 7,900 acres leased by Anaconda, approximately 2,656 acres have been mined and remain unreclaimed. The mine has unstable highwalls with some pits over 250 feet deep. Anaconda submitted a reclamation plan to the United States Geological Survey on September 11th, 1980, the review of which led USGS to conclude that the reclamation of the mine was a major federal action requiring compliance with NEPA. The EIS preparation process has been in progress for the past four and a half years.

On August 16th, 1985, the Anaconda Company withdrew its 1982 reclamation plan and submitted in its stead the 1985 Multiple Land Use Reclamation Plan, which is inadequate.

In fact, Anaconda over the years has submitted six reclamation plans and withdrawn five of them. It's submitted a report by its consultant that stated that there would be subsidence around the mine and then withdrew that report and submitted another one, stating that there would be no subsidence. It submitted a report that stated that highwalls were unstable and then withdrew that report and substituted one that stated that the highwalls were stable.

It submitted a hydrology report that projected the groundwater recovery levels and then withdrew that report and submitted one that projected much

lower recovery levels, and its radiological consultant originally stated that four feet of cover was needed for the hazardous material, and now Anaconda states that no cover is needed.

The problem is that, by them constantly resubmitting new proposals, Anaconda has made it difficult to complete the EIS process. If Anaconda wants its proposed plan to be included in the EIS as an alternative, then it should have submitted it in time to enable the BLM to sufficiently study it and include it in the DEIS.

By delaying its 1985 proposal, Anaconda has created the potential for further delay in the completion of the EIS and the actual beginning of reclamation work. No matter what Anaconda may say, it cannot change the facts. It has submitted six different reclamation plans, and the latest, the 1985 plan, was submitted less than one month ago, right in the midst of the preparation for these hearings. Anaconda's actions can only be perceived as an attempt to delay its obligation to reclaim.

Anaconda entered into discussions in 1980, 1982, and 1985 with the Department of Interior to negotiate the technical issues and volumes associated with reclamation but withdrew from these discussions, often without providing the information to which they had agreed.

Now, after eight years of submitting and withdrawing reclamation plans and consultant reports and four years after the EIS process was begun, Anaconda again withdrawn its reclamation plan and submitted a new plan.

It is obvious Anaconda is seeking to delay the EIS and decision-making process and is refusing to work with the established regulatory procedures to resolve this issue.

In so doing, Anaconda is forcing a substantial portion of the general public, especially the residents of Paguate, to be exposed to unacceptable high levels of radiation. The hazardous material at the mine continues to be widely disbursed by wind, water and erosion. The unstable highwalls at the underground entries at the unguarded and unfenced mine site are easily accessible to uninformed members of the public and are a serious public safety hazard. That no one has been seriously injured or killed is a miracle.

Anaconda latest reclamation plan will turn the mine into a sacrifice area where little or no human activity can ever occur. This plan would not reduce radiation released from the site to acceptable levels. The hazardous material at the site would be subject to erosion by the two rivers that run through the site and would result in a continually expanding area which is unsafe for human use. This new plan, therefore, is not only insufficient, it represents only minimal, temporary reclamation and cannot be considered a serious proposal.

The 1985 plan totally contradicts Anaconda's 1982 plan, and its consultant reports, which confirm the necessity of removing the hazardous material from the stream channels, backfilling the open pits to above the groundwater recovery level, stabilizing the highwalls, covering the hazardous material with four feet of shale and stabilizing the mine site. According to Anaconda's 1982 plan, all of these items were required under the terms of its leases and are necessary to protect the environment.

In order to effectively reclaim the mine site and provide for long-term stability, any approved reclamation plan must include the following items: An appropriate level of compensation for blast damage that occurred in the village during mining operations; a reduction of the slope of all highwalls, especially the North Paguate highwall, since it's close to the town of Paguate; backfilling the open pits to at least 10 feet above the projected groundwater recovery levels and establishing effective procedures for monitoring and raising the level of backfill in the future, if the groundwater recovers to a level higher than projected.

Removing all contaminated material from the river flood plain; covering all contaminated materials with a minimum of four feet of uncontaminated materials and one foot of soil; reducing all slopes to no greater than three to one.

Decontaminating or removing all buildings in the railroad spur where numerous ore spills have occurred; revegetating the site; providing effective procedures for long-term monitoring and maintenance of the site.

The U.S. Department of Interior, DOI, has the responsibility, under the lease terms and regulations, to require that a proper level of reclamation be performed by Anaconda, and the DOI is using the EIS process, as mandated by NEPA, to assist the decision-makers to determine the proper level of reclamation.

Overall, the DEIS represents a massive effort on the part of the preparers and contributes significantly to the resolution of the many issues and concerns that have been raised on this project.

There are, however, a number of areas that require additional effort before the DOI can select the preferred alternative and issue a record of decision.

The Pueblo of Laguna is very concerned that many issues associated directly with health and safety hazard caused by mining operation have been omitted from the DEIS, and these issues are siltation and the increase in radiation in the reservoir downstream from the mine site; damage to structures in the Village of Paguate from blasting and mining operations; returning the mine site to its pre-mining use as farm and range land; investigation of health impacts on members of the pueblo and other mining employees that occurred during mining operations.

These impacts result directly from the mining operations and represent serious health safety hazard to members of the pueblo and the general public within a 50-mile radius of the mine. They must be described in the EIS, and appropriate measures must be included in the approved reclamation plan to mitigate these impacts.

In addition to the above issues which are not addressed in the DEIS, the DOI has failed to take a firm position on the following issues: Resolving the discrepancies of the projected groundwater recovery levels, providing a mechanism for the long-term maintenance of the mine site, and identifying an appropriate design life for reclamation alternatives. The DOI must resolve these issues.

Finally, the DOI has failed to adequately address in the DEIS the land use impacts, air quality impacts during reclamation, costs, revegetation, success and drainage of the reclamation site.

Since the process of selecting an appropriate level of reclamation has been delayed, Anaconda should be ordered to perform interim reclamation of the site to reduce the health and safety hazards and to stabilize the site, pending the final decision on how the site shall be permanently reclaimed.

The pueblo is adamant that the DEIS address the following issues that are of most importance to the pueblos: Mining damage to the Village of Paguate. There are cracks and fissures in the walls throughout the village. Some walls are about to fall down. The repairs performed by Anaconda are not adequate.

Health hazards. It is an absolute contractual requirement for Anaconda to protect the health of all persons from the mine site hazards. Their primary concern is cancer and the birth defects caused by exposure to radioactive materials and breathing radioactive dust.

The EIS process has failed to address the religious significance of the land to the pueblo members as has Anaconda's plans. It must be understood by both the BLM and Anaconda that the land, and particularly the mined area which contains numerous religious shrines, has deep religious significance for the Pueblo of Laguna. This issue is not addressed by Anaconda, and indeed, Anaconda's 1985 plan would likely make it very dangerous for the people to attempt to visit these shrines, if they had access at all.

Anaconda's 1985 sacrifice plan is inadequate and dangerous. In short, it is so disgraceful that Anaconda should be ashamed to have presented it. The pueblo will not accept any plan which would not adequately address the issues I have discussed with you today.

In closing, with all the comments and statements that my people have made versus what the Anaconda consultants and technicians have made, I think we are leaning towards a messy divorce. Thank you.

MR. RAMPTON: Thank you, Governor. Martin Tsiosdia. He will be followed by Larry Lente.

MR. TSIOSDIA: Members of the board, Governor Fernando and members of the Pueblo of Laguna and friends, I wish to make a statement concerning Paguate Mine, because I am from Paguate Village, and I have been in the tribal council many years, a total of 15 years or so, and have kept up with the things that has been discussed, and the mine itself has been talked about right along for years, so this is not the first time it ever has come up.

I have been in the council ever since 1970, off and on, substituting for various tribal members from Paguate, and I have been staff officer in 1980 for the Village of Paguate.

We seem to be more familiar with the tribal operations and the things that have taken place years ago, and my people have asked me to dig up the agreement of the Pueblo of Laguna, so I did, 1972.

There were very vague and very few agreements that I had come across, because I was responsible for people of Paguate. So these are the things that I have written down, tracing the hearings of older people there at Paguate, because Paguate people are more involved in leasing that land, because it's right around the pueblo, and Laguna tribal land, in which the Paguate people are a part of.

I am going to go through this -- what I had written down. The Laguna tribal concerns as of present day is reclamation, reclaiming the open pit mine at Paguate. Agreements between the Laguna Tribe and Anaconda were mostly verbal on the mining, the ore, land lease; Paguate property damages, restoring the mine pit when no further mining is done, now known as reclamation.

Few agreements have been written. Most of our tribal council officials are older men with limited education. Our main concerns are: The health hazards. Studies were made by various people on the effects of uranium ores and tailings. These were done by professionals and were reported to our tribal council.

Escaping radon coming directly from the ore through the vent holes in the underground mine as well as open pit and high rock walls can spread these gases over populated areas which can cause birth defects, cancer and other diseases.

This is too new an ore which the scientists have written about that -- nobody really has explored too much into this kind of an ore, but we are learning what effects it may have. So this is the reason why we have gotten this information, and our councilmen and the tribal council has been talking about these health problems, and we are very concerned.

Escaping radon comes directly through the ore from the vent holes which have not been filled. It's just left unattended. As soon as the company left, why, they put few men there to guard the area, and these have been left without any kind of filling of those vent holes at all. So we are very concerned. Our rock walls are sticking out. You can see them as you drive along the road.

And this can cause a lot of diseases, other than these that I have named. Contaminated mine water can have dangerous effects on livestock, vegetation and carry the flood waters into Rio Puerco. We were told, time after time, that, if you graze sheep around that mining area, the meat may not be fit for human consumption.

So this is one of the things that's a drawback for livestock owners, and we have our livestock around the area, like horses and cattle, and it will no longer be fit for human consumption we were told.

So the best thing to do is to fence that off, and that's what the company did before they left. They at least fenced that area off, but we don't know. All these things can be carried into Rio Puerco, too, and they will contaminate most of the places wherever these flood waters pour into.

Paguate springs, in various areas, went dry because of the water table dropping below. We Paguate people and the Laguna Tribe would be very happy to have all these dangerous areas covered as soon as possible.

I, for one, have been talking to the councilmen at village meetings, which we try to attend every village meeting that comes up, and we ask what have you covered in way of reclamation, and this has been off and on for years, and we want to get this job done as soon as we can, since we have been hearing so much about the health hazards that we are afraid to even dry our fruit, vegetables and meat in the sun on account of radon gases.

I know it fills that whole valley, and it will affect Albuquerque area, Grants, Seboyeta, and all surrounding sections, and we all will get this sooner or later. I know the Navajo Tribe have been trying to get their congressman to approve some kind of funding for the loved ones that they have lost 20 years ago. They all were in the mine pits, and most of them died from cancer. So this must be real dangerous. So we are aware of these very dangerous gases.

This is all my people at Pagate hope, that the reclamation can be carried out very soon, and I, for one, am all for it, because I know we are the guinea pigs at Pagate, and whatever we go through, I know it may have serious effects in another few years. So these are some of the things that I am speaking out for my Pagate people at the Village of Pagate. Thank you.

MR. RAMPTON: Thank you very much. Mr. Lente, followed by Bob Vallejos.

MR. LENTE: Good evening, members of the panel, people in attendance here, citizens of the pueblo, friends, neighbors, a few comments are hopefully points that I would like to make here regarding the Draft Environmental Impact Statement.

Number one, it is not known conclusively that gases omitted from the highwalls or the vents are not of sufficient substance or quantity to be hazardous to health. But doesn't one wonder that some of the deaths that have occurred in very recent history were identified as being of some form of cancer?

Under certain atmospheric conditions in colder months, one can actually see gases omitted from the vents adjacent to State Road 279, and for those of you that have driven that route repeatedly, I think you can attest to that. I do drive that route every day, and particularly in cold months, again, under those atmospheric conditions, you can actually see some emissions out of there.

I am quick to emphasize that, and I acknowledge, that there's no current concrete evidence that it does effect the health, but then I remind you that it's not conclusive that it does not.

There is substantial evidence that health professionals in the immediate area -- that they see enough cases of people living in Pagate, from teenagers to our elderly, who have some form of affliction which may be cancer-related. These include skin conditions, lung afflictions of people who have lived in Pagate and who are former employees of the mining operation, and, in many situations, it is not even explainable.

Number two, and this probably sounds redundant going into the third period of testimony or comments, the two tributaries, Rio Pagate and Rio Moquino,

don't flow through the waste area. Further downstream, they empty into the Rio San Jose, into the Rio Puerco, and into the Rio Grande and very probably into the Gulf of Mexico before contamination dissipates. This is only one form of transmission.

Number three: Dust storms in this area can be of such intensity that it is conceivable to believe that contaminants are being carried into the state's most populated areas of Albuquerque and the suburbs of Taylor Ranch, Rio Rancho, and Paradise Hills. Pollutants, then, or contaminated substances are not confined to the Pueblo of Laguna.

Number four: It is beyond comprehension that our elders would not provide for some reclamation/restoration. Although I acknowledge again that there may not be exact wording or verbage included in the language of leases and addenda thereto, simply put, there are no Laguna words for reclamation or restoration.

However, when one speaks of restoring or repairing to the original, one uses such words as -- and I use a native word --say-z uno nche-stanon-ne-scro. What does that mean? Restoring. Hopefully, to near original, which should necessarily include restoring the land to the extent that it came.

To do anything else would be sacrilegious, and that the citizens of the Pueblo of Laguna hold the land in the very highest regard, as mother earth, and that our forefathers and elders would absolutely not permit the rapement of this land without some provisions for restoring it, absolutely not permit it. Again, specific language may be missing, and for the reasons that I explained.

Further, the era in which the leases were entered into, even today's existent regulatory bodies had not dealt with an open pit uranium mine of this magnitude and had not had to address substantive questions of reclamation. Enforceable laws were nonexistent, possibly, or at best very inadequate.

Continued monitoring must be provided for into the foreseeable future, and I believe that 10 to 15 years is not unreasonable. I believe that the Draft Environmental Impact Statement does not speak on this with clarity.

Number five: Comments should not be confined to blasting activity but rather to quote, unquote, "other related activity," such as disturbance of the water table, causing the ground surface to settle, thereby creating an unstable base.

All of the acreage between the village proper and the cluster of homes to the west, commonly referred to as Chinatown, used to be swampy. I grew up there, and I saw it. All that has dried out and appears to have been pulled down into the pit bottom, creating ponding.

Number six -- I touch on some of the -- of course, some of what appears to be devious methods of the Anaconda Company in an attempt to gain additional concessions.

Number six: In 1964, the home repairs program was initiated by the Anaconda Company. That, in itself, is a form of acknowledgment that it was responsible for the damages. As the company began to realize the costs involved, it reneged on this commitment.

Number seven: A commitment to the pavement of the village streets was nothing more than an effort at peace. It was nothing more than grading by machinery versus meeting our specifications, and laying down an asphalt which has completely deteriorated. There are actually impossible, a foot, 18-inch, sometimes two-feet-deep, gutters on either side, either side of that pavement.

Number eight: The loop that goes around South Paguate pit, portions of that State Road, 279, was without the prior approval of the New Mexico State Highway Department. It did not meet minimum standards or specifications. I need not reveal my source here; however, if additional investigation were to be undertaken, I am very confident that this can be borne out.

And if nothing else, the aesthetics, the appearance of that area. Right on our doorsteps of the Village of Paguate is this big, gaping hole, and I believe that some of our older citizens who have lived there all their lives -- and I believe on this. So it's been proven that exposure to these conditions on a continuous basis could be proven to be hazardous to our people.

The old traditional methods of fruit preparations, including drying meat out in the open, fruits, vegetables, which is later then consumed -- and again, these methods are not confined to Laguna Pueblo. Seboyeta, to the east, practices that also.

So the point of emphasis here -- this is not confined or restricted to the Pueblo of Laguna. It has far-reaching impact, and I believe we will see the consequences for many years to come. Thank you.

MR. RAMPTON: Thank you, Mr. Lente. Bob Vallejos, and he will be followed by Mr. Jaramillo.

MR. VALLEJOS: Mr. Chairman, members of the panel, Honorable Governor, Anaconda representatives, ladies and gentlemen, good evening. I am Bob Vallejos, vice chairman of the board of trustees at the Seboyeta Land Grant. I wish to inform the panel and the Anaconda representatives that, upon consultation with our legal counsel, we, the people of Seboyeta Land Grant, the board of trustees, intend to take legal action against Anaconda Company as a result of damages done to the houses in Moquino and surrounding area due to their mining and blasting operations.

I wish to commend the Governor of Laguna and his people for a fine and thorough job of making their presentation at these hearings.

We, the people of Seboyeta, have lived with the Lagunas in peace and harmony for over three centuries, and to this day, no problems exist. We negotiated the Paguate land purchase several years ago, and to this date it holds good. No problems.

Thirty years ago, the industrial giants came, mainly the mining contractors, and created dead-end jobs and a whole bunch of confusion. I would like to point out that yesterday, attorneys at the hearings in Albuquerque for Anaconda stated that they had fulfilled their contract in full to the Laguna Tribe.

Today they come back in a lower tone of voice and a completely different attitude. With this, I conclude my comments. Thank you.

MR. RAMPTON: Thank you, Mr. Vallejos. Mr. Jaramillo, to be followed by Mr. Thomas, and I know I have that name spelled correctly.

MR. JARAMILLO: Members of the panel and Laguna people, my name is Louis Jaramillo. As people know, I live at Moquino for several years, I being the school bus driver for several years. In the early years of the 1960s, I started to have problems with my house. The walls started breaking, cracking down real bad.

Because of Anaconda mining southeast of Moquino, they were blasting, and we could feel the concussion, so there I went and talked to a lawyer, and finally I sued Anaconda. We went on trial at the District Court at the county, and I won.

Then Anaconda appealed to the State Supreme Court. It took less than two years when the trial was, but I won again, and this is my little comment for today.

MR. RAMPTON: Thank you, Mr. Jaramillo. Robert Thomas, followed by Calvin Pino.

MR. THOMAS: Good evening. My name is Robert Thomas from the Village of Paguete. I am a staff officer of the village and also former member of the council.

Each morning, I guess everybody in Paguete gets up, gets out of bed. If you look to the east, and all you see is a big hole in the ground, which Anaconda had dug up and have ruined for my people.

For many years before Anaconda ever come in or any mining company came in, that land was used for agriculture, grazing domestic animals, whatever. The land was in good use. But now, after several years of digging that place up, we may never use it again.

Yesterday, I attended the first conference in Albuquerque. There, the company experts, everybody that was there, were telling us the mine was safe. There's hardly any radiation. The highwalls are safe. They will never fall over or fall down. It is safe to walk close to the highwalls without worrying that a big rock will fall on top of your head. This is what the experts were telling us.

And yet, in the past, they kept saying we can almost never use the land again. It was highly contaminated. Nothing would never grow, maybe except weeds and stuff like that.

It will never be used for farming. Domestic animals cannot go in there and eat grass, and we cannot eat those animals, if they do get in it. This is what we were told for many years, and yesterday we heard different.

Then, who are we to believe? We can't believe anybody now. And they even suggested that we turn the place into a recreation area, make fish ponds out of it, irrigation wells or whatever, maybe a small swimming hole. Now, how can this be when they kept telling us that that place was highly contaminated?

We have two nice fish ponds about four miles away from here, where good, clean water comes in. My people of Paguate don't want that stuff. They don't want a recreation area in there. We want the land reclaimed, back to where it would be usable.

We want the highwalls sloped at three to one, so animals, people alike, can walk up and down without any danger. We want the area or the site reclaimed, where grass, plants, even vegetables, can grow again. That's what we want, and that's what my people of Paguate want. They don't want a tourist attraction, a monument or something to remind them that the land has been ruined.

Paguate used to have a big piece of land for its use that they used to use. Now there's -- we are only probably a little corner now. These are the things that we would like to see and we want Anaconda to do. We are not going to let Anaconda go until they fulfill these obligations.

All these other recommendations, we don't want. I think it's our land. Or it is our land. I think it's up to us to use it the way we feel, whenever we feel we are going to use it, whatever we are going to do with it. And now everybody realizes that it is your land. It's up to you to say what you are going to do with it after it is reclaimed the way we want it. We want that land to look beautiful again, like it used to. Thank you.

MR. RAMPTON: Thank you, Mr. Thomas. Calvin Pino, followed by Daniel Carr.

MR. PINO: Chairman, board, Governor, the people of the Pueblo of Laguna, neighbors, earlier this afternoon, there was concern about cracks in the homes in Paguate. One of the questions I had was if they claim that the cracks were not caused by blasting on the mine site, then why doesn't structures in other villages crack? They were built all about the same time, and I am sure that all the homes built in all the villages were built with care. They have got strength. They have been there for a long time.

Even the homes in Seboyeta were built with care, and they have been there a long time. One of the concerns that the people in Paguate have is that they would like to have their homes rebuilt, not just patched up. Like it was mentioned before, you cannot strengthen the wall just by patching it up. You have to tear it completely down and rebuild it all over again.

I am sure that the people aren't necessarily looking for a home that's going to be a two-story house with 10 rooms, a sun roof, solar heating.

Most of the people are used to living in homes where they can heat it with wood, and I think most people would be satisfied to have a nice home with a wood-burning stove, rather than to have the fear of gas heating.

I would like to also bring up the problem of the Paguate Reservoir or otherwise known as Quirk Reservoir, which is located downstream from the mine site. While employed for Anaconda, I had noticed that, several times, through the main gate, they had built a dirt crossing so that the vehicles could go across the stream coming down.

Okay. During July, we get, the monsoon season, and that's the time we get, during heavy rains. A lot of that material that was piled through that river area was washed downstream.

Conrad Lucero had mentioned that irrigation was one of our main interests here on the reservation, and with the loss of that reservoir, about 80 percent of the people downstream do not plant anymore, because the problem is -- actually, the first time of planting, they have got some water coming down through the Rio San Jose.

As the other villages start planting, they rely on that reservoir to continue watering their crops. But with that silted area in there, the reservoir can no longer hold water to take care of all the crops downstream. So we have lost that much.

Another thing is wildlife. With that silted reservoir, you no longer see geese, ducks or other animals in that particular area, because there's hardly any water left. That area covers almost 500-plus acres that could hold water. Right now, I would say it doesn't even hold no more than .5 acres, only half an acre, of water.

If we get that reclamation to include that part of the downstream, then we will have a chance to go ahead and get back into agriculture. We would have the chance for wildlife to go ahead and continue to use that particular reservoir as a stopover on the trip south and back north.

Okay. Talking about weather, and I think Larry Lente had covered most of what I had wanted to say, but I would like to go ahead and confirm some of his views.

Several years ago, when the space shuttle was first going to make its landing in White Sands, New Mexico, there was a real heavy dust storm the day before, and they didn't think it was going to make it.

On the weather that night before, they showed a satellite photo, and that photo showed dust from the White Sands that tailed all the way into the State of Texas.

Now, if the wind can carry dirt from the middle of the State of New Mexico across the border, then you know for sure that, any time there was a large concentration of dust, radioactive dust, or pollution from diesel fumes, that this was carried into the Rio Grande Valley area and then across. So those people, it concerns them, too.

We talked about rain, and that carries a lot of that silt downstream, and a lot of it goes past and down toward the southern part, southeastern part, of the Laguna Reservation. There's only just a handful of you, but it concerns everybody on the reservation, because there's people that are not here tonight that have livestock, down in the lower flat areas, raising sheep, cattle, and where do you get your water?

Most of it comes out of the Rio San Jose. The tanks down in that area probably have contaminants that the wind carried into those ponds.

We should have scheduled a baseball game for tonight. Maybe everybody might have showed up, and we could sit around, while everybody is here, and say, "Let's have a meeting." But we can never get everybody at important events.

Those are my views, and, remember, I wish there was more younger people here, too, to support this program, because it's for their future and the future of their kids and all of you here, the future of your grandkids. Thank you.

MR. RAMPTON: Thank you, Mr. Pino. Daniel Carr, followed by Victor Sarracino.

MR. CARR: Good evening panel, members of the Pueblo of Laguna. My name is Dan Carr. I am a tribal member, and I am formerly a resident of Pagate, but I live down in Mesita now.

I would like to make my comments to the damage of homes in the Pagate area. For the last couple of days, I have heard statements from Anaconda attorneys, from lawyers, technicians, making positive statements to the effect that blast damage is not Anaconda's responsibility and that conclusions drawn from a study was due to the age of the structures as well as due to settlement.

Anaconda has stated that the Bureau of Mines reached similar conclusions. No blast damage. Anaconda cites that the EIS needs to be rewritten, due to major errors in technical data.

I would like to point out a couple of items. One, that the records on the intensity of the blasts were not recorded until about 1966, some 12 or 15 years later, after blasting had begun. Two, that the blast damage study was made on framed houses. I want you to note this, because it becomes rather pertinent. Framed houses built of wood.

Anaconda stated that Bureau of Mines came to the same conclusion. Bureau of Mines did not do an independent study. They took this same report and drew their conclusions from the same report that Anaconda drew their conclusions from. I think, if Bureau of Mines arrived at conclusions on an independent study, I think this would become valid as a supportive statement or fact.

In other words, taking the same data or the same report, one can logically come to the same conclusions. What is most alarming is that Anaconda can take data from a completely different type of structure, built of wood, and apply that data to a structure built of stone and conclude identical results.

Anaconda claims age for the deterioration of these structures. Somebody mentioned a few minutes ago that there are still historic structures that are still standing of the same type of construction. But we find, in Anaconda's statements, that all of a sudden all the village -- or all the structures at Pagate have all reached the same age where they can deteriorate or fall apart at the same time or the same period of time.

Anaconda also claims settlement as part of the reason for the structures deteriorating. You have heard testimony that the Village of Pagate is built primarily on rock. You have heard testimony that the highwalls consist also of sandstone and shale. Our annual precipitation rate on the average is around eight inches per year, eight, nine inches per year. Most of this precipitation falls within or during the summer period in the form of summer thunderstorms.

His statement has been only certain homes will be damaged by the earth movement, and then more damage will be caused by the concussion, or a hard blow, especially when the blasting was done at the same level as the village, and that this gives a shattering effect.

In the Jackpile Mine area, there lies a dike, a body of igneous rock that goes from one end of the mine through the Village of Paguate. In addition, a fault of at least 30-foot width runs right through the Village of Paguate, and certainly this has a definite effect from the target of volume of blasting.

The point here is that blasting during the operation of the mine -- tremendous damages have been done to the adobe homes which are built of rock and dirt mortar, which in many cases are built of adobe mixed with straw.

As regards to strip mining operations relating to the following, there was drilling of blast holes, blasting either by controlled or uncontrolled pattern. In other words, there were times during the training when our young men were being trained to blast. There was at times overloading of those drill holes, and each one of these blasts are all instantaneous, and at times, maybe, if the caps weren't put on properly, two would go off at the same time, and that really shakes the ground, creating highwalls, sloughing of highwalls, blasting of trenches at the water level, blasting of trenches below the water level, the exposure of ore, emitting radiation either at low grade or at a high, high grade level, exposure of open pit mines, also causing emissions.

The above issues are hard and fast issues that relates to definite plans and implementation of a good, solid reclamation of the area as was mentioned in the contract, referred to as restoration. The result of the above to this date has received no strict attention by any regulations under the mining principles, nor has any plan addressing specific areas of concern been expressed.

The reclamation plan submitted by several parties have not fully addressed the issues that would correct the following: The highwalls in which controlled blasting or controlled sloughing can be applied; the filling in of the deep holes; the water level controlled to clean out any form of contamination, including a groundwater level recovery; the operation of another mine is still in question, and it has to be settled; reclamation of drill test holes that still exist in the outskirts where exploration was conducted, especially in the prospecting area. This is outside of Anaconda mining area. There are some drill holes which still exist, and also including the fixing of the roads in the prospecting and exploration areas.

The repairs and rebuilding and compensation of damages -- damaged homes in the Village of Paguate. I did serve on a committee known as the land committees to take care of some of the issues in the Paguate area for at least 15 years, and it was very sad and very emotional to try to settle some of the hurts that these people had.

You all mentioned that there has been psychological hurts, so how do you place a price tag on anything that -- anyone that's been hurt psychologically? People in the Paguate area paid their sweat equity in their farming lands and any improvements thereof.

However, each one of these people, especially those that have done farming for many years, consider the area very sacred and, therefore, have constantly made comments that it should be restored so that the land can be laid to rest for later production.

The side effects in the area of health needs special attention, perhaps leading to a thorough physical examination periodically of our people at Paguate. All departments and agencies involved in health, environment and ecology should certainly join efforts towards reclaiming of the Paguate mining area so that it will not be harmful or hazardous to life and limb.

Most of all, that the water stream be restored back to its natural backflow and that irrigation lands be brought back to vegetation. Absolutely nothing has been done to this date in any way of reclamation in what has been known as restricted area.

When all this is done, an apology is due by way of genuine interest and guarantee that the land be reclaimed and back to its normal contours, valleys and water flows. The people, as well, in the surrounding neighboring areas will be most grateful.

In conclusion, I support the EIS plan and a portion of Anaconda's plan in that further efforts be made to go back to the drawing board for further planning and review and eventually an implementation of a reclamation plan that is an agreement of every party concerned. This plan should not be an alternative. It should be the plan to restore it.

In closing, the Anaconda Company should live up to its practical, moral and legal obligations, and by the same token, it should live up to its corporate reputation in this nation.

Certainly the Pueblo of Laguna marriage recognition with the one-time Jackpile Mine, which had the nation's largest single deposit of uranium ore, the U308, in the United States, through its federal government, known as the Economic Energy Commission, had first choice to circle of five.

Why have they not supported any legislation towards reclamation of uranium mines after it's closed down? With the talent of our Laguna people and work force, and with the scientific expertise and engineers of various departments, we can all certainly beautify the Jackpile Mine area, and it can be said that Anaconda has put forth its money for a good cause. Thank you.

MR. RAMPTON: Thank you, Mr. Sarracino. We have a request for three more speakers. Since we have been here for some time without a break, we will recess this hearing until 20 minutes to 9:00. (Recess taken)

MR. RAMPTON: This hearing will come to order. Our next speaker will be Chris Shuey, followed by Paul Lusk.

MR. SHUEY: Mr. Hearing Officer, members of the panel, ladies and gentlemen, my name is Chris Shuey. I work for Southwest Research and Information Center in Albuquerque. I direct the groundwater protection project there.

Some of you may know that Southwest Research has been involved in uranium mill tailings and uranium mine waste problems and reclamation for many years now. We commented on a number of occasions, including, I believe, in the hearing for this reclamation plan back in 1980 and 1979.

I have some preliminary comments that I would like to make, and I would like to let the BLM know that we will be submitting detailed technical comments in writing at the close of the comment period.

My colleague, Paul Robinson, had done most of the work analyzing the Anaconda plans up until a few days ago when he was in a traffic accident and is not able to be here tonight.

So my review is an amalgamation of some of the things that he had put together and my own brief review of the Draft Environmental Impact Statement. Anything that I say tonight, we will provide documentation for during the written comment period.

In terms of some general comments, we certainly support the Department of Interior's decision to go ahead with reclamation of the Jackpile Mine with the primary focus being protecting people's health and the safety of people and animals, livestock, around the mining area.

We tend to think, however, that, if one of the major goals is unrestricted use, eventual unrestricted use of the reclaimed mining area, that the Laguna proposal, with improvements, comes closest to meeting that objective.

We do not believe that any of the Anaconda proposals will provide any kind of long-term stability for the highwall areas, the waste piles, the ore piles, or any kind of long-term protection for the hydrologic cycle of surface water and groundwater so that the people here will have to be ensured or guaranteed that contamination won't raise its ugly head again in 10, 15, 20, 50, 100 years.

When you undertake reclamation -- and the word restoration has been used. I use the word cleanup, because it's getting rid of your garbage. It's taking your garbage out, or it's putting it under something where you hope it won't get into people's water and people's air and people's lands for a long time.

But what you are trying to do is put the land back into a shape where you can use it now, and you can use it tomorrow, and your kids can use it, and their kids can use it. These proposals don't go that far, in our view.

We tend to think that Anaconda's last proposal, which came in at the 11th hour, it seems, and is not the subject of this draft environmental statement, is really a slap in the face. It shows that the company is not really concerned about carrying out its obligation.

Whether that obligation is legal or not, it's certainly moral. The company has been here for a long time. It's mined and made some significant profits off of the ores and the resources of the tribe, and now it goes through the obligation of putting the land back in the shape where you can use it.

We look at the Anaconda 1985 proposal as really only slightly better than the no-action proposal, and the no-action is to do exactly that, leave it as it is, and I don't think anybody wants that.

I might say that, in reviewing the documents here and generally in reviewing reclamation plans, you try to figure out why you reclaim it. What are the reasons? One of the reasons -- and I don't know if it's been brought out in the other hearings -- is that your resources are already in some way affected by the mining operations over time.

The water quality in the stream or the groundwater is not what it used to be, apparently. It has contaminants in it. They are at higher than normal levels. In some cases, they are in levels that are not significant. Whenever there is an increase in pollution of one type or another, whether it's in water, whether it's in air, whether it's in the soil, the people always run an increased risk of getting some health effect.

Now, that risk may be very small. It may not show up for years. It may never show up. It may show up in a short amount of time. It can come through the plants, the animals, but eventually it gets to humans.

Our advice is: Don't believe the claims that there is no excess or increased risk. There is and there will continue to be until the levels of the various kinds of pollutants, whether they are precious metals or radionuclides, are brought back down to where they were before the mines came.

I have some general concerns, and one of them is this continuing lack of criteria, standards, for reclamation of uranium mines. The Environmental Protection Agency a couple of years ago in a report to Congress rejected recommending to Congress that uranium mines be subject to either a federal remedial program or a cleanup program or that standards and guidelines be adopted.

There are close to 400 abandoned uranium mines in New Mexico. They are 350 on the Navajo reservation to the west. It is a large-scale problem in the southwest. The BLM, outside of this process, could go a long way by recommending that the Department of Interior recommend to Congress that federal attention be given to the lack of standards for uranium mine reclamation.

I have noticed, in looking at the last two Anaconda proposals, the 1985 proposal of August 16th and the 1982 proposal that's in the EIS, that there are some significant changes. There was, at one point, a 200-foot so-called waste-free zone that would be enacted around the Rio Moquino and the Rio Pagate. That's now down to 50 feet. That's not enough protection, as far as we can tell.

The amount of topsoil to cover the waste piles and the ore piles is cut from five feet to one foot. The kind of flood protection that would be offered for the waste piles and the protore piles in the pits after backfilling is not designed on the basis of -- you folks would know the term -- probable and maximum flood.

That's the total amount of water that can come down in a heavy thunderstorm at any one time in any kind of condition. And it's different than what you may hear of 100-year flood. Those things are frequencies of occurrence. How often do they occur? On the average, they only occur once in a blue moon. They can occur two times in the same day.

In some of the original proposals, it appeared that the waste piles and the protore piles would be backfilled into the pits. Some of those piles now, under the new plan, are to be stabilized where they are, and stabilized means having a foot of topsoil put on time.

I also noticed that the kind of topsoil is what they call Tres Hermanos sandstone. Tres Hermanos is a highly, what they call, friable sandstone that can break up. It's highly erosive.

Many of you folks from around the area know about the seepage problem from the Sohio tailings pile north of Anaconda's Jackpile Mine. One of the problems there is that those waters -- that that pile sits on top of this kind of sandstone. It leaks down in very easily, the waters do, and they pond. Consequently, they can come out from under the pond and out on the Seboyeta Land Grant at rates anywhere from 40 to more than 100 feet per year.

It's not the kind of topsoil that you would want to use, in our opinion, to reclaim and put on top of the protore piles and the waste piles in the Jackpile Mine.

We are aware of some of the recent laboratory and field tests of different kinds of cover material for uranium mill tailings. The principal problem of long-term stability is gullying from sheet erosion.

Anaconda offers, to my knowledge, no basis for the claim that slopes of 1.7 to one can withstand that kind of sheet erosion. There are some of the piles that have slopes of one and a half to one, 1.6 to one, that they do not plan to re-grade to get down to a three-to-one or four-to-one slope.

As you already know, there is ponding in some of the pits. Water infiltrates into the bottom of the pits from the groundwater level. All the proposals -- this is one of our major concerns -- all of the proposals propose backfilling to various heights in the pits. All would allow the water levels, the groundwater levels, to recharge or come back up into the pits.

When this happens, the water will go through the contaminated soils and materials, the ores, the wastes. Whether there's one foot of dirt on top of those wastes or whether there's 10 feet, in our view, does not provide adequate enough protection such that the metals, the radionuclides, the hazardous pollutants, contaminants, in those soils will not leach in or become part of the water. We think that they will.

If that's the case, that groundwater in that area, after reclamation, is not going to be very fit for use. It may clean itself out, chemically. It may change every time and clean itself out, but over a very long period of time.

Anaconda's last proposal, the one foot of cover in some of those low-lying areas that are subject to ponding, would simply create swamps.

I might mention that we are familiar with seepage and groundwater impacts from various different mining facilities, especially uranium facilities, and have a lot of data the bureau can draw on, if it so desires.

Radiologically, there are several maps in the draft environmental statement, and they show some very interesting information. There are areas along the railroad tracks that obviously have ore that has been blown off the rail cars when they are transporting it over to the mill. There are high radiation levels in isolated areas.

In fact, some of those isolated areas are also approximately in the area where the highest radiological contamination of the Rio Paguete has been noted, in the stream water.

Those areas, those high gamma areas, have to be cleaned up. They have to be returned to background, which, in our view, is anywhere from 10 to 20 microrigets (sic) per hours.

There's a statement in the DEIS that the uranium values in the water are below drinking water standards, and I quote the New Mexico groundwater regulation of five milligrams per liter. You should understand that the level for the chemical toxicity of uranium is three and a half milligrams per liter, and that, for purposes of public drinking water supplies, the State of Arizona has reduced the standard by one full point to .035 milligrams per liter or 35 parts per billion on the basis of health concerns for people and animals who drink the water.

Prior to issuing a Final Environmental Impact Statement, you should consult the State of New Mexico, which is now wrapping up, in cooperation with EPA and the Indian Health Service, a study of radionuclide concentration in the tissues of animals in three areas of the state, the Churchrock area, the Crownpoint area, and the Ambrosia Lake area.

And I believe, based on conversations with folks who were close to the data, that it will show that there have been noticeable increases over what was expected to be normal in the tissues of animals who have drank, on a chronic or long-term, over-the-years basis, what we call mine dewatering of water, the water that comes out of underground mines.

In this case, the area around here in the Jackpile Mine was not studied. The animals were not studied. The local people might consider making a recommendation that future studies include animals from around this area.

One of the other speakers tonight noted that many of the Navajo people in the northwest corner of New Mexico and the northeast corner of Arizona are still suffering the respiratory effects, the lung cancers and the other diseases associated with their mining of uranium ore in underground mines, and the statement was made that there's plenty of evidence to understand and to know that radon gases and the other kinds of radioactive materials that comes out of mines can be hazardous in certain quantities.

You should not let claims to the contrary fool you or comparisons between apples and oranges. You want to return this area to the condition where you can use it.

There may be a lot of people killed on the highways every year. There may be people slipping and dying in their bathtubs, but that does not lessen your risk, and that does not mean that Anaconda has any less responsibility to you.

To close, we would just recommend that the Interior Department, BLM and the BIA, reject Anaconda's proposals. Seventy percent reclamation, when I was in school, is only a C. We try to strive for A's, and at least my parents always made me try to strive for A's, and a 95-percent reclamation completion is a much more obtainable goal.

You should give great consideration to the Laguna proposal with improvements. This is the Lagunas' land. It was their ore. It should be the tribe and the people of the tribe and not Anaconda that selects the reclamation plan for this mine. Thank you.

MR. RAMPTON: Thank you, Mr. Shuey. Paul Lusk, to be followed by David Riley.

MR. LUSK: Members of the panel, Governor, members of the audience, my name is Paul Lusk. I am an architect, a land planner. I do site design and hydrologic analysis professionally. I also teach those subjects at the University of New Mexico.

I am speaking tonight, though, in the role as an individual, as a professional, a concerned and interested citizen. I have not had the chance to -- I just recently had the opportunity to see the Environmental Impact Statement, so the comments that I have tonight are really preliminary. I do intend to look more carefully, if I can -- get a copy and look more carefully and summarize comments that I would have resulting from that review.

The comments I have tonight, then, may not be the most significant. They are simply the ones that I have been able to note and make notes on in the time I have had to review it.

I understand, also, about the more recent proposal by Anaconda. I do feel, as a citizen, concerned to speak to the issues in the EIS, because it is most inappropriate to consider that as part of the present hearing procedure. Because it is not available, I have not had a chance to see it and have heard only word of mouth about it.

I also feel that, from what I have heard about it, it would cause delay. It would require a modification to the EIS, an amended statement, and such delay may not be appropriate. I feel that there is an obligation to get on with reclamation of the land to be of use and value to the Laguna people.

My understanding is that Anaconda was required, as part of the lease agreement, to put up a 40 million dollar bond. Perhaps, if an agreement can't come out of this hearing process, that bond might be sought by the pueblo or by the agencies in trust to get on with the task of reclamation.

A suggestion has also been made that that money might be invested to obtain the difference between the 47 and 50 million -- or 57 million that is suggested to meet the concerns of Laguna Pueblo in the Laguna proposal.

Specific comments I have -- I will be very brief because of my cursory nature review -- they will be about the slopes of the waste piles, about stream flow, about the pit areas, and about the affected environment; in particular, the most affected people, the Laguna people.

The slopes or the waste material piles, the problem is erosion, revegetation, usability. The objective is a sustainable landscape. From my experience, three to one slopes are minimum for long-term sustainability. That texture, coarseness, as the EIS speaks to, can be obtained also in the EIS. The contoured furrowing -- that contour furrowing can be of a level to be similar to mini-terraces.

These, then, are usable by animals, when revegetated, for grazing. They are not a terrace that would require storage of water; therefore, eliminating concerns for piping and other legitimate concerns identified in the EIS.

I would also like to suggest some resources both to the BLM and to the Pueblo of Laguna, resources that are available for reclamation. Existing conditions or existing experience that would bear in this case -- and I suggested that it might be included in the review in the recommended actions and by the pueblo in their plan of action.

In particular, with regard to slopes on steep areas, the Soil Conservation Service completed a reclamation task in the 50s. I think it was completed in 1955 on the north slopes of the Sandia Mountain, where they put in place some, essentially, erosion control features. A number of them are experimental.

They are now 30, 35 years down the road, and the success of certain of those and the lack of success of others are available to be seen. The project was called Rio Armijo, and the written information on the ground information is available to parties interested.

Top soil concerns, I think, were addressed previously. Depth is critical. Wind is, of course, the problem primarily. Gullying and erosion on slope conditions are critical. I won't -- I will have more comment on that.

Stream flow. The problem, of course, is erosion, edge conditions, head water cutting of arroyos. The objective, again, is long-term sustainability. I think the previous speaker, Chris Shuey, spoke to the issue of centerline and distance from centerline and changes that have been suggested.

I would suggest that the concern should be for mitigation of effects from the flow line, not the centerline. The reason is, of course, that stream flow is undulating, and to take from a centerline gives a differential in protection.

The protection should be from an edge condition, such as a 10-12, 12-4, 100-year, whatever might be appropriate, but it is not a constant width.

Gradient should not be greater than that prior to mining. I think that is also part of the Laguna proposal and the Department of Interior proposal.

The specifics, I think -- or rather the Environmental Impact Statement speaks to filter dams. Although I think I use a different word, the idea is porous dams that reduce the gradient of the flow but do not cause erosion downstream from the small dams.

I would suggest to you, as a source, first a document by Charles Dipeisso from the Amarant Foundation in Arizona regarding the Casas Grandes people in southern New Mexico and northern New Mexico. The reason I mention that particular source is that the Casas Grandes people developed a drainage management system around the year 900 to 100 AD that is still in operation today without maintenance from that time, or very minimal maintenance.

The techniques is the use of chinchetas or small filter dams, and the head waters are run through the eroding landscape, which seeks to and over the time has caused a reduction in flooding and essentially is a flood-control strategy.

It has also resulted in increased vegetation because of sedimentation in these small step dams, or continuous series of dams being placed, but not spill-over dams. My point is that they are porous.

It also has allowed, for the people who now use that area, more cattle to be supported because of the increased vegetation also resulting from the reduced flood potential.

A third source -- because of the time it takes to say these things, I won't go into detail -- but of concern is sinuosity or the meandering of the streams, which should be returned to their pre-mining length of flow, and I would suggest to you a master's thesis completed last year by Dr. James Lewis at the University of New Mexico, dealing with nested sinusoids.

It actually deals with the San Antonio arroyo in the City of Albuquerque, which those who are familiar with that, is the arroyo next to the community of La Luz on the west side.

The point of it is that, even in an awkward position, the drainage systems can be designed so that they do not increase erosion. They are stable in their location with appropriate reclamation.

The pit areas, I have not had a chance to go into detail on them. I believe that the Laguna proposal of a minimum of 10 feet of soil about the estimated water table recovery level is a minimum requirement, and that the Department of Interior's strategy of fill and see on a performance basis is perhaps an appropriate addendum to that.

My feeling is that a low gradient contour bottom of refilled pits with revegetated, grassed steps in the landscape might be the most prudent handling of the area.

I am quite surprised at the recent -- at least my understanding of the recent Anaconda proposal of the use of phreatophytes as water control in backfilled pits. Phreatophytes are plants that pump water, essentially, from deeper in the ground, such as salt cedar.

I think they would be inappropriate in that those plants have deep roots and essentially would pump up heavy metals and other materials, from radioactive materials and ores, from a deeper level. Essentially, it would be a swamp.

I have general recommendations that flow gradients not greater than existing prior to mining will be the strategy that should be pursued. Again, I suggest the Soil Conservation Service plan that was implemented in the north Sandia slopes as an excellent example of appropriate technologies for such reclamation.

Affected environment have more things than I have time to speak to right now. I think the most important is the most affected population, the Laguna people, and I think they are very summarily treated in the Environmental Impact Statement. The emphasis in the EIS appears to be radiological mitigation, where the most significant impacts may be the much more mundane issue of erosion, sedimentation, heavy metals contamination, salinium sulfates and other real and substantial concerns.

The purpose, of course, of the reclamation, ultimately, is the economic reuse -- the rebuilding and economic reuse of this large area in the central part of the Laguna Pueblo. What the particular optimum plan or action would be, I don't have that information.

Whether revegetation for grazing or sloping areas for, as has been suggested, photo something take use or plant farming for manufacturing or other specific actions, I think are -- consider the concern and responsibility of the pueblo. What is needed, though, I think, is getting on with implementation of reclamation strategy based on the Laguna plan for future use.

This reclamation plan must be consistent with the long-term well-being of the Laguna people and the surrounding people, and I speak as a person in the surrounding area and to the sustainability of the land over the long-term. Thank you.

MR. RAMPTON: Thank you, Mr. Lusk. David Riley, who is now our last scheduled speaker.

MR. RILEY: Fellow tribal members, concerned people, judge, panel, I hope you are all well in mind, body and spirit this evening, because I am not; and I direct my comments basically to Anaconda, and I am here speaking as a design architect, a planner, an urban designer.

Yesterday, I was at the meeting, 1:00 meeting, and I heard a few things that did not set well with me; mainly, Anaconda's statement that they felt they didn't have a commitment to do anything for us to restore our land to the way our forefathers came here and saw it.

I will address a little history of the area, which is rich in tradition. The folklore of peoples in this area are many. I feel the white society does not understand that and how we are tied to this land, as has been brought up by concerned people of this pueblo.

Many people have passed through here who talk about the stone houses. Many times they were built that way so others can use them in their travels. So we do have a sense of place here, and, as an architect, that's what I look for, I strive for. Is that a sense of place, I ask you? What can you give us back?

They talked about the restoration. What does it all mean? We know we can never be to our original state. I can never be a child again. This mining, hopefully, is the last of any impact. The railroad impact destroyed agricultural days, split the land. We are now involved in water litigation rights. The impact has begun.

I am here today, because I do have a personal commitment, not only to my peoples -- because I am half Hopi, also, and I hope to God this never happens there, because we are prepared out there. I have a commitment as a professional to architecture and to planning, because this is what my people have given me. They have given me an opportunity to be here today.

Nothing was brought up about Indian way of use of land, that I understand. Many people here are named by Indian names, which take meaning from nature. What you know of us is not just ceremony. It is a way of life, and we are here because we come from the earth, and we have heard very long testimony as to personal feelings, technical aspect, hearsay, and even myself have just gotten ahold of this draft, and then I find out there's another, a sixth. Again, as a professional, I am very disturbed.

You know, Anaconda has been here 30 years. Thirty long years, and in three years, they want to get the hell out of here. How are they going to do that? In a way, I am glad this crisis has come up, because Anaconda, you have given us the opportunity to band together again.

Very many solutions, proposals, legal actions were brought up. Mr. Lusk and Mr. Shuey and all the others that spoke, we all are concerned, but we feel there is a solution and a conclusion. It will not be a DEIS proposal. It will not be a Department of Interior proposal. It will not be a Bureau of Land Management proposal, and it surely will not be a Department of Energy proposal.

It will be the Laguna plan by the Laguna people for the Laguna people, and, as an artist -- also, the aesthetics, the visual impact that it has on my balance of mind, I cannot even relate that to you. Even as a professional, I am very disappointed to trust responsibilities that are being held by this government.

So today, I tell the people that today our day has come, and it is up to us now, because we have heard so much from so many ladies and gentlemen that sit here who really believe in that, and it concerns everyone, not just here, as Mr. Lusk said. It concerns everyone, the whole world, and, as the governor mentioned, this is one of the largest pits in the world, and I doubt if every -- if many people in Albuquerque know that.

Again, I thank you, Anaconda, for bringing us together. Thank you.

MR. RAMPTON: Thank you, Mr. Riley. For myself and for the members of the panel, I would like to thank everyone that has appeared here and expressed their views for their expertise and for their manner of expression. I have learned a lot myself. I come into this very cold, only as a chairman, and I am not going to be in on the decision-making process, but I have been glad that I have been present, because I have learned a lot personally.

I would like to thank Governor Fernando for his assistance to the panel members in coordinating this hearing and give him an opportunity to make a final statement.

MR. FERNANDO: Thank you, Judge Rampton. Members of the Bureau of Land Management, Anaconda, and other members of the pueblo, I wish to convey my thankfulness to you on behalf of the pueblo for giving my people the opportunity to express their concerns and reviews, and I hope that these comments are taken seriously and that full consideration is given, because I value my people's time and effort in coming to make these presentations to the panel, to the decision-makers.

I can't express any more clearly, as my people stand up here, and in Albuquerque, yesterday, emotionally or otherwise -- I want to make one thing clear. No, my people did not go through any kind of formal training. No, they were not asked to make the comments in a certain way. These were individual comments, expressing their true feelings, and I am very happy, and I can't say any more, but I am really proud of my people for the way they conducted themselves in making their presentation.

I did not recognize any extreme facetious criticism. I think the criticisms that were expressed to the company, to the technicians, to the consultants, BLM, BIA, whoever -- I think it was done in a real professional manner, and I am very proud of my people, and I would like to, again, reiterate that, no, they were not trained, because this isn't a communist country.

This is a democratic reservation, and I will, to the best of my ability, fight for what is rightfully due them in every way possible. Thank you again for allowing my people and myself to -- and Anaconda for taking time out to listen to us.

Just a few words in my native tongue, probably the same words, anyway.

MR. RAMPTON: This hearing is adjourned. Good night.

(Hearing adjourned at 9:30 p.m.)

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